

Digitized by the Internet Archive
in 2012 with funding from
Duke University Libraries

bulletin of
Duke University
1988-89

Information and Regulations

Trinity College of Arts and Sciences
The School of Engineering



THE DUKE STUDENT HONOR COMMITMENT

A unique aspect of a liberal education is its attempt to instill in the student a sense of honor and high principles that extends beyond academics. An essential feature of Duke University is its commitment to an atmosphere of integrity and ethical conduct. As a student of Duke University I accept as my personal responsibility the vigorous maintenance of high standards of honesty, truth, fairness, civility, and concern for others.

My devotion to integrity establishes that I will not cheat in academic work, and that I will adhere to the established and required community code of conduct. According to the dictates of my own conscience, I will report behavior in violation of such established standards. In addition, and beyond the requirements of any code or law, I confirm my own commitment to personal honor and integrity in all matters large and small. Even though the ideal of honor is an abstract one, by implementing this ideal, I join the men and women of Duke University in making the concept of honor a reality.

The Duke Student Honor Commitment was developed by students of the Class of 1982, approved through a student-wide referendum and presented to President Sanford at graduation (May, 1982). The President's Honor Council was created the following year to promote and represent the ideals embodied by the Honor Commitment.

The Duke Student Honor Commitment differs from other university honor codes in one fundamental way: it is strictly a personal commitment that is not enforceable by any judicial or regulatory action. Each student is responsible for thoughtfully determining his or her own concept of honor and then adhering to that standard according to his or her conscience. It is hoped that your concept of honor will develop and mature during your Duke career.

It is the goal of the President's Honor Council to help establish and reinforce the Duke Student Honor Commitment as a cherished tradition of Duke University. We trust that the accumulation of individual acceptances of the Honor Commitment will achieve this goal.

bulletin of
Duke University
1988-89

Information and Regulations

Trinity College of Arts and Sciences
The School of Engineering

EDITOR
Judy Smith
SENIOR EDITORIAL ASSISTANT
Elizabeth Matheson
BULLETIN COORDINATOR
W. Paul Bumbalough

Typesetting by Paste-Ups Limited, Research Triangle Park, North Carolina
Printed by PBM Graphics, Research Triangle Park, North Carolina

Contents

University Calendar 1988-89	5
University Administration	6
Student Services	8
Administrative Offices:	9
Trinity College of Arts and Sciences	10
The School of Engineering	10
Faculty Advising	10
Student Affairs:	11
Vice President for Student Affairs	11
Counseling and Psychological Services	11
Cultural Affairs	12
International House	12
Minority Affairs	12
Placement Services	13
Religious Activities	14
Residential Life	14
Student Activities	14
Student Life	16
University Union	16
Student Health Services	16
Accident and Sickness Insurance Policy	17
Department of Housing Management	18
Office of Alumni Affairs	18
Academic Information	20
Miscellaneous Academic Policies and Procedures	21
Procedure for Resolution of Students' Academic Concerns	21
Statement on Sexual Harassment of Students	22
Residential Information	24
Residential Facilities	25
Residential Regulations	26
Regulations and Judicial Boards for Residential Units	27
Housing License	27
Revocation of the Housing License	27
House Dues Policy	27
Assistance for Living Groups in Collecting Dues	28
Living Off-Campus	29
Refund Policy of Residential Deposits,	
Rent Prepayment and Board Payments	29
Fire Safety	29
Privacy of Student's Room & Apartments	30
Care of Residence Hall Rooms & Adjacent Campus Areas	31
Living Group Building Improvements	33
Bar Policy for Residence Halls	33
Exterior Sign Policy for Residence Halls	34
Residence Hall Bench Policy	34
Annual Review of Residential Groups	34
Responsibilities of Residential Groups	35
Housing Policies for Selective Living Groups	36

Student Life	40
The Undergraduate Community	42
The Judicial Code	42
University Regulations and Policies	45
Alcoholic Beverages	45
Party Promotion	49
Campus Banner Policy	49
Conferences and Conventions	49
Discrimination, Appeal Procedure	50
Dogs on Campus	50
Drugs	50
Fire Equipment	50
Fireworks, Other Explosives, and Weapons	51
Hazing	51
Identification Cards	51
Library Materials Security	51
Library Policy Concerning Food, Drink, and Tobacco in Public Areas	52
Medical Center, Student Traffic	52
Noise (Disorderly and Destructive Behavior)	52
Painting Policy	54
Parties in Residential Areas Outside of Residence Halls	54
Party and/or Event Registration	54
Party Promotion	54
Policy on Use of Segregated Facilities	54
Policy for registering "Theme" Parties	54
Roofs and Ledge Areas—Unauthorized Access	54
Policy Concerning Films	54
Safety	57
Solicitation	58
Student Records	58
Traffic Regulations	58
Vending and Electric Games Equipment	58
Video Cassette Recorders	58
Policy on Nondiscrimination	59
Academic Honesty	60
Appendices	66
Appendix A—Terms under which Duke University Licenses Occupancy of Residence Hall Space and Central Campus Apartments	67
Appendix B—Duke University Department of Food Services Contract	78
Appendix C—Judicial Structure	80
Appendix D—Residential Judicial Code	100
Appendix E—Pickets, Protests, and Demonstrations	107
Appendix F—Rules Governing Drug Violations	108
Appendix G—Bursar's Payment Plan	109
Appendix H—Student Health Grievance Procedure	110
Telephone Numbers Frequently Used	111
Index	112

University Calendar, 1988-89

Fall, 1988

August	
24	Wednesday. Orientation begins. Assemblies for all new undergraduate students
29	Monday. 8:00 A.M.; Fall semester classes begin.
30	Tuesday. 4:00-6:00 P.M. Drop/Add begins, Intramural Building
31	Wednesday. 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M., Drop/Add continues, 103 Allen Building
September	
1-2	Thursday-Friday. 8:30 A.M.-12:30 P.M.—Drop/Add continues, 103 Allen Building
5	Monday. Labor Day, classes in session
6-9	Tuesday through Friday, 8:30 A.M.- 12:30 P.M. and 2:00-4:00 P.M. Drop/Add continues, 103 Allen Building
October	
14	Friday. Last day for reporting midsemester grades
14	Friday. 6:00 P.M.. Fall break begins
19	Wednesday, 8:00 A.M. Classes resume
21-23	Friday-Sunday. Homecoming
November	
4-6	Friday-Sunday. Parents' Weekend
7-10	Monday-Thursday. Registration for spring semester, 1989, 103 Allen Building
23	Wednesday, 12:30 P.M. Thanksgiving recess begins
28	Monday, 8:00 A.M. Classes resume
December	
8	Thursday, 6:00 P.M. Fall semester classes end
9-11	Friday-Sunday. Reading period
11	Sunday. Founder's Day
12	Monday. Final examinations begin
17	Saturday. Final examinations end

Spring, 1989

January	
9	Monday. Orientation begins
11	Wednesday. Registration and matriculation of new undergraduate students
12	Thursday. 9:00 A.M. Spring semester classes begin
13	Friday. 4:00 P.M.-6:00 P.M. Drop/Add begins, Intramural Building
16-20	Monday-Friday. 8:30 A.M.-12:30 P.M. and 2:00 P.M.-4:00 P.M. Drop/Add continues, 103 Allen Building
23-25	Monday-Wednesday. 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.—Drop/Add continues
February	
24	Friday. Last day for reporting midsemester grades
March	
10	Friday, 6:00 P.M. Spring recess begins
20	Monday, 8:00 A.M. Classes resume
April	
3-5	Monday-Wednesday. Registration for fall semester, 1989, and beginning of registration for summer terms
26	Wednesday. 6:00 P.M. Undergraduate classes end
27-30	Thursday-Sunday. Undergraduate reading period
May	
1	Monday. Final examinations begin
6	Saturday. Final examinations end
12	Saturday. Commencement exercises begin
12	Sunday. Graduation exercises. Conferring of degrees

University Administration

General Administration

H. Keith H. Brodie, M.D., LL.D., *President*
Phillip A. Griffiths, Ph.D., *Provost*
Eugene I. McDonald, LL.M., *Executive Vice-President*
William G. Anlyan, M.D., D.Sc., *Chancellor*
Joel L. Fleishman, LL.M., *Vice-President*
I. Peyton Fuller, A.B., *Vice-President, Planning and Treasurer*
William J. Griffith, A.B., *Vice-President for Student Affairs*
John J. Piva, B.A., *Vice-President for Alumni Affairs and Development*
Patricia C. Skarulis, M.A., *Vice-President for Information Systems*
Andrew G. Wallace, M.D., *Vice-President for Health Affairs*
John F. Adcock, M.B.A., *Corporate Controller*
N. Allison Haltom, A.B., *Secretary of the University*

Trinity College of Arts and Sciences

Richard White, Ph.D., *Dean*
Albert F. Eldridge, Ph.D., *Associate Dean*
Martina J. Bryant, Ed.D., *Assistant Dean*
Elizabeth S. Nathans, Ph.D., *Assistant Dean and Director of the Premajor Advising Center*
Mary Nijhout, Ph.D., *Assistant Dean and Director of Health Professions Advising Center*
Deborah A. Roach, Ph.D., *Assistant Dean*
Robert P. Weller, Ph.D., *Assistant Dean*
Gerald L. Wilson, B.D., Ph.D., *Assistant Dean*
Ellen W. Wittig, Ph.D., *Assistant Dean*
Charles W. Byrd, Jr. Ph.D., *Assistant Dean for Academic Affairs*
Thomas D. Mann, A.B., *Assistant Dean for Administration*
Lee W. Willard, Ph.D., *Assistant Dean for Planning and Development*

The School of Engineering

Earl H. Dowell, Ph.D., *Dean*
Marion L. Shepard, Ph.D., *Associate Dean for Undergraduate Affairs*

Student Affairs

William J. Griffith, A.B., *Vice-President for Student Affairs*

Counseling and Psychological Services

Jane Clark Moorman, M.S.W., CCSW, *Director*
John C. Barrow, Ed.D., ABPP, *Assistant Director*
Rolffs S. Pinkerton, Ph.D., ABPP, *Psychologist*
Kenneth Rockwell, M.D., *Psychiatrist*
Elinor Roy Williams, M.S.W., CCSW, *Assistant Director*
Thomas E. Sibert, M.D., *Psychiatrist*
Joseph E. Talley, Ph.D., ABPP, *Psychologist*

Cultural Affairs

Susan L. Coon, M.A., *Director*
Linda Carl, Ph.D., *Assistant Director*

International House

Carlisle C. Harvard, B.A., *Director*

Minority Affairs

Caroline L. Lattimore, Ph.D., *Dean*

Placement Services

Laurence P. Maskel, Ph.D., *Acting Director*
Patricia O'Connor, Ed.D., *Corporate Relations Specialist*
Johnnie Lawrence, *Assistant Director*
Dian H. Poe, A.B., *Career Counselor*

Religious Life

William H. Willimon, M.Div., S.T.D., *Minister to the University*
Nancy A. Ferree, M.Div., *Assistant Minister to the University*
Mary Parkerson, A.B., *Chapel Development Officer and Administrative Assistant to the Minister to the University*
Joe Creech, B.A., *Inter-Varsity Leader*
John Wall, Ph.D., *Chaplain to Catholic Students*
Velma Ferrell, B.D., *Chaplain to Baptist Students*
Hubert F. Beck, M.Div., *Chaplain to Lutheran Students*
Frank A. Fisher, M.A., *Chaplain to Jewish Students*
Earl H. Brill, Ph.D., *Chaplain to Episcopal Students*
David O. Jenkins, M.Div., *Chaplain to Methodist Students*
John Hamilton, M.A., *Navigators Staff Person*
Douglas Humphrey, B.S., *Campus Crusade for Christ Representative*
Susan D'Arcy Fricks, M.Div., *Presbyterian Campus Minister*

Residential Life

Richard L. Cox, M.Div., Th.M., Ed.D., *Dean*
Ella E. Shore, M.R.E., M.A., *Associate Dean*
David W. Jamieson-Drake, Ph.D., *Assistant Dean*
Leslie Monfort Marsicano, M.Div., *Assistant Dean*
Frank H. McNutt, B.A., *Assistant Dean*
Charles M. VanSant, M.Div., *Assistant Dean*
Benjamin Ward, Ph.D., *Assistant Dean*
Barbara L. Bushman, A.B., *Coordinator, Student Housing*

Student Activities

Homai McDowell, M.M.S., D.B.A., *Director*
Adande Washington, A.B., M.A.T.S., *Financial Manager*

Student Health

Howard J. Eisenson, M.D., *Director*
Robert Gringle, M.Ed., *Assistant Director*
Penny Sparacino, R.N., *Nursing Supervisor, University Infirmary*

Student Life

Suzanne Wasiolek, M.H.A., *Dean*
W. Paul Bumbalough, A.B., *Assistant Dean*

University Union

Jake Phelps, B.A., *Director*
Peter Coyle, A.B., *Associate Director*
Beth Budd, *Program Advisor*
Krista Cipriano, B.F.A., *Coordinator, Arts and Crafts Center*
Gloria Wagner, *Financial Adviser*

Student Services



A number of resources within the University are relied upon by undergraduate students for counseling and information relating to both academic and personal matters. In addition, the University provides a variety of services for students in areas such as health care and postgraduate employment. Some of these resources and services are available through the office of the individual school and college; others are provided by University-wide offices and departments. For additional information consult the *Bulletin of Undergraduate Instruction*.

Administrative Offices of the School and College

TRINITY COLLEGE OF ARTS AND SCIENCES

The Dean of Arts and Sciences and the Dean of Trinity College, Dr. Richard White. The Dean of Arts and Sciences acts as the University's chief academic, budget, and executive officer for the Arts and Sciences departments (some thirty in number) and for selected interdisciplinary problems.

The Dean is responsible for developing and maintaining the quality of the academic programs in Arts and Sciences in consultation with appropriate faculty and students and for planning and organizing efforts to generate funds for the operation of the departments and programs. The Dean recommends to the Provost policies and budget needs concerning academic affairs. He implements the policies and acts as chief budget officer in relation to them.

The Dean is the University's executive officer for the academic affairs of undergraduate students in Trinity College of Arts and Sciences, and he recommends to the Provost policies concerning such affairs. The Dean presides at meetings of the UFCAS. He is assisted in executing these responsibilities by the Associate Dean of TCAS and the Assistant Deans of TCAS.

The Associate Dean of the College, Albert F. Eldridge. The Associate Dean has a broad range of responsibilities. He primarily assists the Dean in developing and maintaining the quality of all academic advising programs for undergraduates. In consultation with the Assistant Deans of the college and the Directors of Undergraduate Studies in the various departments and programs of Arts and Sciences, the Associate Dean recommends to the Dean administrative policies and budget needs of the college. The Associate Dean also participates in the work of selected University and UFCAS committees, reviewing programs and policies within the jurisdiction of the college. As review officer of the college, the Associate Dean acts on any appeals of the Assistant Deans of the college, as well as all academic appeals of the Undergraduate Judicial Board.

Assistant Deans Martina Bryant, Elizabeth Nathans, Mary Nijhout, Deborah Roach, Robert Weller, Gerald Wilson, Ellen Wittig. The Assistant Deans are often referred to as the students' "academic deans." In the college they are responsible for a wide range of activities. In general, the Assistant Deans advise students about academic matters, careers, fellowships, preprofessional planning, Program II, foreign study, and any other issues of academic concern to students; supervise individual student's progress toward graduation and certify completion of degree requirements; administer and coordinate programs; provide information about programs, advising, policies, procedures, and regulations to faculty members requesting it; enforce academic regulations; serve on various UFCAS, University, and TCAS committees; act as editors of, or as liaisons with editors of TCAS publications such as the *Undergraduate Bulletin*; and perform other duties delegated by the Dean or Associate Dean.

One of the Assistant Deans serves as Director of the Pre-Major Advising Center for freshmen and for sophomores who have not declared a major. The other Assistant Deans are divisional advisers—in the humanities, the natural sciences, and mathematics, and the social studies divisions—for all students who have declared a major. (See Administration of the College, above.) The relationship between these Assistant Deans and the faculty advisers is a complementary one. Faculty advisers have primary responsibility for advising about major courses and requirements. The Assistant Deans monitor graduation requirements, handle requests for exceptions, and deal with unusual academic problems and any change of status questions.

THE SCHOOL OF ENGINEERING

Dean Earl H. Dowell. The Dean of the School of Engineering has overall responsibility for instruction and research in the school as well as for the educational experience and welfare of its students. The Dean works with various constituencies including the University administration, faculty, students, and alumni on matters of general policy and delegates responsibilities within the school to members of his staff.

Associate Dean Marion L. Shepard. The Associate Dean has responsibility for academic matters pertaining to undergraduates, and for working with the academic departments in helping to establish student's programs of study. He counsels with freshmen before they arrive on campus, and through summer correspondence with them, assists in making preliminary selection of courses for the fall semester. He also plans and directs the orientation of the freshmen. Under his supervision, engineering faculty members serve as advisers to students. He approves leaves of absence, courses to be taken elsewhere, the dropping and adding of courses, academic probation, dismissal or withdrawal from the school, transfer into or out of the school, and similar matters. He serves as the Dean's deputy in representing the school on campus, among alumni, friends, supporting industries, and governmental organizations. He also provides primary liaison with the Office of Placement Services.

FACULTY ADVISING

Apart from academic counseling of students by faculty members whom they come to know on an informal basis, faculty advising of undergraduates in Trinity College and the School of Engineering takes place in three primary ways. First, in Trinity College of Arts and Sciences, faculty members serve in the Premajor Advising Center as general academic advisers to groups of freshmen and premajor sophomores and are available for individual conferences; second, in the School of Engineering, freshmen and sophomores are counseled by special faculty advisers before the students choose their department; and third, in all departments, the director of undergraduate studies and other faculty advisers are available to assist students concerning academic matters pertaining to their departments.

Student Affairs

Vice-President for Student Affairs, William J. Griffith, 106 Flowers. The Vice-President for Student Affairs has the ultimate responsibility for most noncurricular aspects of a student's activity and welfare and works directly with the following offices in fulfilling that responsibility.

Counseling and Psychological Services, Jane Clark Moorman, Director, 215 Anderson Street. The CAPS staff provides a coordinated and comprehensive range of counseling and psychological services to meet the unique needs of individual students in regard to their own personal development.

Services are available to all undergraduate, graduate, professional, and allied health students enrolled in Duke and include evaluation and counseling/psychotherapy regarding personal concerns of a wide variety. These include family, social, academic, career, and sexual matters. The professional staff is composed of psychologists, clinical social workers, and psychiatrists who are experienced in working with young adults. Individual, couples, and group counseling and psychotherapy are utilized in helping students resolve their concerns once the student and staff member have identified together the most helpful alternative.

Students with indecision about career plans can receive individual or group counseling from professional career counselors. Career testing and/or a computerized career guidance system called DISCOVER may be used. A career library is maintained, which includes a wide selection of vocational and educational program resource materials to assist students in choosing a career and/or further training programs in graduate or professional study. The library is available for all Duke students whether they are involved in counseling or not.

CAPS also offers time-limited seminars and groups focusing on personal development. These groups have the advantage of pooling resources and support while at the same time teaching skills. In the past, such groups have covered coping with stress and tension, exploring career goals, assertiveness, enhancing relationships, and understanding eating disorders. However, other seminars may be offered to meet student interest.

Another important function of CAPS is the availability of the staff to the entire University community for consultation and educational activities regarding student development and mental health issues affecting not only students, but the campus community as a whole. The staff works with other campus personnel including administrators, faculty, resident advisers, Student Health Service staff, Religious Life staff, the Office of Placement Services, Freshman Advisory Counselors, PISCES, Project Wild and other student groups in meeting whatever needs of students are identified through such liaisons.

Standardized testing is also administered for the university community by CAPS, including graduate and professional school tests such as the LSAT, MCAT, and GRE.

CAPS maintains a policy of **strict confidentiality** concerning information about each student's contact with CAPS staff members. Such information can be released, however, upon the student's specific written authorization. Initial evaluation and brief counseling/therapy, as well as career and skills development seminars are covered by the student health fee. There are no additional costs for these services. If appropriate, a referral may be made to other staff members or a variety of local resources including multidisciplinary mental health professionals in private practice and clinic settings.

CAPS offices are centrally located at 215 Anderson Street on Central Campus. Appointments may be made by calling 684-5100 Monday through Friday between 8 A.M. and 5 P.M. However, if a student's concern needs immediate attention, that should be made known to the secretary, and every effort will be made to arrange for a counselor to talk with the student immediately.

Office of Cultural Affairs, Susan Coon, Director, 109 Page. The Office of Cultural Affairs, located just off the entrance of Page Auditorium, is responsible for the creation, coordination, and implementation of many of the cultural and popular entertainments which take place on the campus. The office is directly responsible for the Duke Artists Series and Quadrangle Pictures (35 mm film program), and the Chamber Arts Society Series; it also schedules the use of Page Auditorium and directs the use of this hall. For the Summer Session Office, Ms. Coon directs the Duke University Summer Festival of the Arts, and works with the Institute of the Arts. Performances relating to campus, drama, music, and arts organizations are facilitated through this department's Page Box Office, which also serves all other programs. In addition to these arts-related activities, the Duke University Yearly Calendar is published and distributed from this office. In order to avoid conflicts, all campus events should be recorded by the calendar office as early as possible. The office also serves in an advisory capacity to student groups sponsoring major events.

International House, Carlisle C. Harvard, Director, 2022 Campus Drive. International House is the center of cocurricular programs for more than 400 students from 66 countries who are presently enrolled at Duke. Programs which assist students from abroad in participating in the life of the Durham and Duke communities include: an intensive orientation program at the beginning of the academic year; the International Friends Program (formerly Host Family Program), in which interested international students may become acquainted with American families; the Duke Partners Program which pairs an American and a visiting partner for weekly meetings to practice English and to learn about each other's cultures; the International Wives Club, which provides a structure for international women to meet with American women in an informal atmosphere; the Speakers' Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community; intermediate-level English conversation and grammar classes which meet twice a week; the Friday coffee break in the basement of the Chapel which is sponsored by Campus Ministry especially for internationals and friends. The International Association is a student organization which includes a significant number of American members, as well as international students. The association plans social and cultural programs which emphasize personal contact and the informal exchange of ideas among students from diverse backgrounds. Included are weekly open-houses with lectures, films, pot-luck dinners, or parties; periodic trips outside of Durham; and an annual International Day on campus which draws visitors from throughout the area. Additional information may be obtained by writing to Carlisle C. Harvard, Director, International House, 2022 Campus Drive, Duke University, Durham, North Carolina 27706.

The Office of Minority Affairs, Caroline L. Lattimore, Dean, 107 Union West. In 1972 the administration of Duke University established the Office of Black Affairs to meet the needs of black students. Six years later (1978), the name was changed to the Office of Minority Affairs (OMA). This office is an interdisciplinary/student service component of the University which attempts to assist minority students in their adjustment to student life. Its very existence suggests a commitment on behalf of Duke University towards implementation and centralization of services designed to address individual problems in our minority student population.

Within its organizational structure, OMA has five divisions: (a) the *administrative support staff* consists of undergraduate students who assist the Dean and the administrative secretary with clerical matters and general office operations; (b) the *counseling staff* is composed of graduate and/or professional students who offer peer counseling and advice to each minority undergraduate; (c) the *tutoring staff* is composed of undergraduate, graduate, and professional students who offer tutorial services in mathematics and chemistry; (d) the *research and development staff* conducts and offers statistical and historical

research relevant to the programs, projects, and services of OMA; (e.) the *executive staff* consists of the Dean and the administrative secretary who organize and manage all OMA organizational and fiscal matters. Within the organizational structure of OMA, all staff members work to achieve the following objectives: to offer quality and humanistic counseling and advising for minority students; to advocate and promote quality human relations among the Duke University student body, faculty, and staff; to serve as a resource for student support services, faculty, and students on matters relating to minority students.

The major program components of OMA are: Counseling in Academic and Social Affairs (CASA), the Tutorial Program in the sciences and other courses, and the Duke **PREVIEW** program (DPP). In coordinating these diverse services, OMA provides a mechanism through which these programs function.

The CASA program for undergraduates was designed to function as a supportive agency emphasizing various social, personal, and academic concerns. While providing specialized counseling services for minority students, CASA's primary functions have been to reach those students who may be experiencing difficulty, to assist them, and/or to refer them to support services which may be beneficial to them. Additionally, CASA works closely with students who are progressing well in the University while serving as a channel of communication for minority students. The CASA staff offers counseling through outreach, referrals, and organized group activities. Individual counseling, group learning, guidance-related activities, and professional activities are areas of concentration in the counseling process. CASA also encourages its counselees to explore and test their interests and skills in a variety of academic and professional fields.

In conjunction with the Departments of Mathematics and Chemistry, Physics, Biology, etc., OMA has initiated a tutoring program to facilitate higher achievement and improve the academic performance in these disciplines. The tutoring program offers individualized tutoring services for those students who need such assistance. Efforts are made to provide assistance as soon as possible through early identification. The tutoring program is free to all students who qualify for financial aid. The program also assists students in identifying tutors in other academic areas, if needed. Tutors meet weekly with the students and maintain continuous dialogue with CASA counselors, classroom instructors, University administrators, and University deans.

The Duke **PREVIEW** Program (DPP) was designed to ease the precollege student's personal transition from high school to college. This multiracial program introduces students to academic and student life at Duke University. The program offers concentrated academic experiences.

While simultaneously providing academic enrichment, **PREVIEW** through individual, group, and peer counseling provides supportive relationships to enhance the social growth of the participants.

The Dean of the Office of Minority Affairs is responsible for the management and direction of all OMA operations. These include a broad range of responsibilities such as budgetary and payroll matters, research projects, official correspondence, individual and group counseling, public relations, and policy making, and coordination of the CASA and tutorial programs. The Dean of OMA maintains continuous dialogue with the Pre-Major Advising Center, the Academic Deans' staff, CAPS, the Office of Student Affairs, Student Activities, the Offices of Undergraduate Admissions and Financial Aid, the Religious Life staff, the Placement Office, and numerous student organizations. All students are encouraged to utilize the services of the Office of Minority Affairs. Individual and group conferences with OMA staff members may be scheduled daily.

Office of Placement Services, Laurence Maskel, Acting Director, 214 Page. The staff of the Office of Placement Services is the liaison between Duke students and potential employers. Students seeking permanent employment, career apprenticeships, or information about alumni in the Duke Network may consult the staff member who has the

responsibility for each area. Members of the staff are available to help students plan a program which will provide a variety of employment opportunities in their career interest fields. A library of general and specific career information is available for students to use, and a list of Duke alumni who have agreed to talk individually with students about various career fields is also available. The Office of Placement Services cooperates with other departments to plan seminars to give students an opportunity to talk with people in a variety of career fields, sponsors seminars on identifying career options, and offers sessions on interviewing and other techniques for finding employment.

The Office of Religious Activities, William H. Willimon, Minister to the University, Duke Chapel. The Minister to the University and a combined staff of twenty-two are responsible for providing a diversity of ministry which takes seriously Duke University as a pluralistic religious community. This broad ministry includes services of worship (both in Duke Chapel and in other locations in the University), programs of religion and the arts, opportunities to develop caring and serving communities, and opportunities to respond to critical social issues. Persons in the University are given an opportunity to help direct and shape this ministry and to participate in its many committees and programs. Chaplains and campus ministers are also available for individual counseling with students and others in the University community.

Office for Residential Life, Richard L. Cox, Dean, 209 Flowers. The Dean for Residential Life is concerned with the personal well-being of students and the development on the campus of a residential community supportive of a good educational experience. These concerns are addressed by the Dean and his staff through the housing of undergraduates in the residence halls, through advising students regarding personal problems, and through assisting students to plan and present educational and cultural programs within the residence halls. Over one-hundred Resident Advisers (RAs), who are staff members of the Office for Residential Life, reside in the residence halls and are directly responsible for the satisfactory administration of the student residences and their programs. They are also available for counseling students and/or referring them to the various personnel services which provide specialized advice or counsel.

The Office of Student Activities, Homai McDowell, Director, 101-3 Bryan Center. The Office of Student Activities coordinates undergraduate group activities and advises both undergraduate and graduate clubs and organizations. The office serves as a liaison between the University administration and campus groups, clubs, and organizations. It is a clearinghouse for information on reserving rooms for film showings, meetings, and parties, as well as for information on obtaining services from other University departments.

The office offers workshops and other instructional and programmatic aids to promote the development of leadership and organizational skills within student groups, and to foster interaction among club officers. The office also administers the Student Affairs Leadership Assistance Program and coordinates the participation of clubs and organizations in such activities as Black Student Weekend and Student Activities Day. The Financial Manager, Ms. Adande Washington, advises club treasurers and provides instruction in bookkeeping, budgeting, and fundraising. In addition, the office maintains a copy service for the convenience of student groups and organizations.

Opportunities for learning a variety of job skills are available under the office's internship program. Student interns have opportunities to either design or develop their own jobs, or to get hands-on experience in areas such as advising, leadership training, university administration, programming, public relations, auditing, financial management, and data processing.

The office also coordinates a variety of community service projects, including Share Your Christmas and serves as a liaison between the Duke community and the Volunteer Services Bureau of Durham.



Office of Student Life, Suzanne Wasiolek, Dean, 109 Flowers. The Dean for Student Life is responsible for advising individual students regarding personal or judicial problems. She also develops the orientation programs for freshmen and transfer students and serves as adviser to the Interfraternity and Panhellenic Councils. The coordination of the application of the general rules and regulations of the University and the files on student cocurricular honors, responsibilities, and membership are handled in her office.

The Assistant Dean for Student Life, Paul Bumbalough, works with all participants in the judicial process and coordinates the student advising system.

Dean Wasiolek and her assistant work with the Freshman Advisory Council (FAC), which is composed of upperclass men and women who are selected for qualities of responsibility and leadership. Members of the FAC are assigned to a small group of freshmen and, during orientation, they welcome their groups and help acquaint them with the University. The Office of Student Life also works with entering transfer students and the Transfer Committee, assists handicapped students, and coordinates the Student Health and Student Insurance policies.

The University Union, Jake Phelps, Director, Bryan University Center. The Bryan University Center, in the heart of the West Campus, is the hub of student, cultural, and service activities. It houses, among other groups, the University Union which brings students together in carrying out its stated purpose—to stimulate, promote, and develop the social, recreational, cultural, educational, and spiritual activities of the Duke University community. The Union sponsors a broad program including lectures, concerts, recreational activities, dances, and exhibits adapted to the leisure time interest and needs of individuals and diverse groups within the University and Durham communities. Also included under its auspices are services such as the Scheduling and Information Office and a copy facility; Student Locator Service; video-screening room; and creative opportunities such as the Craft Center, original film productions and the campus' closed-circuit cablevision broadcasting system. While most of these activities are headquartered in the University Center, the Union programs are campus-wide.

Student Health Services

Student Health Program, Howard J. Eisenson, M.D., Director, Pickens Building. The goals of the Duke Student Health Program are to provide comprehensive high quality medical care, encourage students to make informed decisions leading to healthy lifestyles, and to act as a liaison when students need medical care not available at Student Health.

The components of the Student Health Program include:

1. Student Health Service, located in the Pickens Building.
2. The University Infirmary, located on the fourth floor of Duke Hospital, South Division, for overnight or short term care in the event of illness too severe to manage in the dorm, yet not severe enough to require hospitalization.
3. The Student Sports Injury Treatment and Prevention Clinic, located in Card Gym.
4. The Health Education Program, headquartered in the Pickens Building, and operating campus-wide.

The Student Health Service at Pickens is open during both regular and summer sessions. The University Infirmary is open from the opening of the University in the fall until graduation day in the spring. All currently enrolled full-time students and part-time degree candidates are required to pay the student health fee. All fees are paid directly to the Bursar's office. Information regarding the fee is available at the Bursar's office.

The resources of other services within the Duke University Medical Center are available to all Duke students and their spouses and children. Charges for any and all services received outside of the Student Health Program from the Medical Center are the

responsibility of the student, as are the charges for services from physicians not associated with Duke University.

Policy Regarding Medical Excuses.

1. Class absences may be excused only by the academic dean upon certification from Student Health Program practitioners. Such certification must indicate that the illness (a) is of such a nature that it is necessary to restrict a student's activities and/or (b) medication has been prescribed which impairs the student's ability to study or attend class; and/or (c) the student has been a patient in the University Infirmary. In cases where illness occurs away from campus, appropriate information must be presented to a Student Health clinical provider.
2. Absences cannot be excused by the deans if they result from minor illnesses which do not require that a student's activities be restricted or if Student Health Program staff were not contacted during the actual time of the illness.

Students who have any questions concerning these policies and procedures or individual cases should contact their academic dean.

Confidentiality. Confidentiality attached to the student's health record is carefully maintained. Release of any health information requires prior permission of the student involved. Such a policy is strictly enforced irrespective of the requesting source (e.g., University official, parents, family of the student, governmental authorities, physicians not immediately involved in the care of the student).

IMPORTANT TELEPHONE NUMBERS

Scheduling Appointments at Pickens Health Center: 684-6721
University Infirmary: 684-3367
For Emergency Transportation (University Public Safety) day or night
On campus: Campus Police: 684-2444
Off campus: Durham Ambulance Service, Durham telephone: 477-7341

STUDENT HEALTH CLINIC HOURS*

At Pickens Health Center	
Monday-Friday	8:00 A.M.-6:30 P.M.
Saturday	10:00 A.M.-1:30 P.M.
Sunday	2:00 P.M.-4:30 P.M.

*Hours reduced slightly during midwinter break and during summer sessions.

FOR AFTER HOURS PROBLEMS (when Pickens Health Center is not open)

University Infirmary: 684-3367
Medical Center Emergency Department: 684-2413

THE DUKE STUDENT ACCIDENT AND SICKNESS POLICY

The Duke Student Accident and Sickness Policy is provided by the National Student Services, Inc. in association with Hill, Chesson and Roach, Durham, North Carolina. The insurance policy provides coverage for hospitalization, major medical expenses, certain surgical services and limited treatment and diagnosis on an outpatient basis. There are also provisions available for coverage for the student's spouse and dependent children.

Participation in some supplemental health insurance program is strongly suggested for students. All full-time and part-time degree candidates are required to enroll in the Student Accident and Sickness Policy unless they sign a waiver that they are covered by other comparable insurance or accept responsibility for all medical expenses. The policy number and name of the insurance is required on the waiver.

Detailed information regarding this insurance coverage is available in the Dean for Student Life's office. Student Health also offers information on insurance coverage via its student patient advocacy service.

Department of Housing Management.

Fidelia Thomason, Director, 218 Alexander, Apartment E. The Department of Housing Management, an Administrative Services Division auxiliary, is responsible for residence hall and apartment facilities on East, West, Central, and North Campuses. The department has responsibility for the following services: physical maintenance of the residential buildings with work performed by the Physical Plant Department in the residence halls and Housing Management in the apartments, custodial care of the residential facilities, key issue and control (rooms and buildings), storage of personal effects, and control of furniture and equipment. Housing Management is also responsible for summer assignments and graduate student academic year and summer assignments in Central Campus Apartments. Business matters related to residential fees and rents come under the purview of the department. Residence hall and apartment business matters should be discussed with the Housing Administration office, 218 Alexander, Apartment B. Questions about a student's facility service needs should be discussed with the residential area service office: 101R House D, 684-5486, for residents of main West Campus except Few; House VOO, 684-5559, for residents of Few and Edens; Hanes House desk, 684-5394, for residents of Hanes, Hanes Annex, and Trent; Gilbert-Addoms desk, 684-5320, for residents of East Campus; and 217 Anderson Street, 684- 5813, for residents of Central Campus.

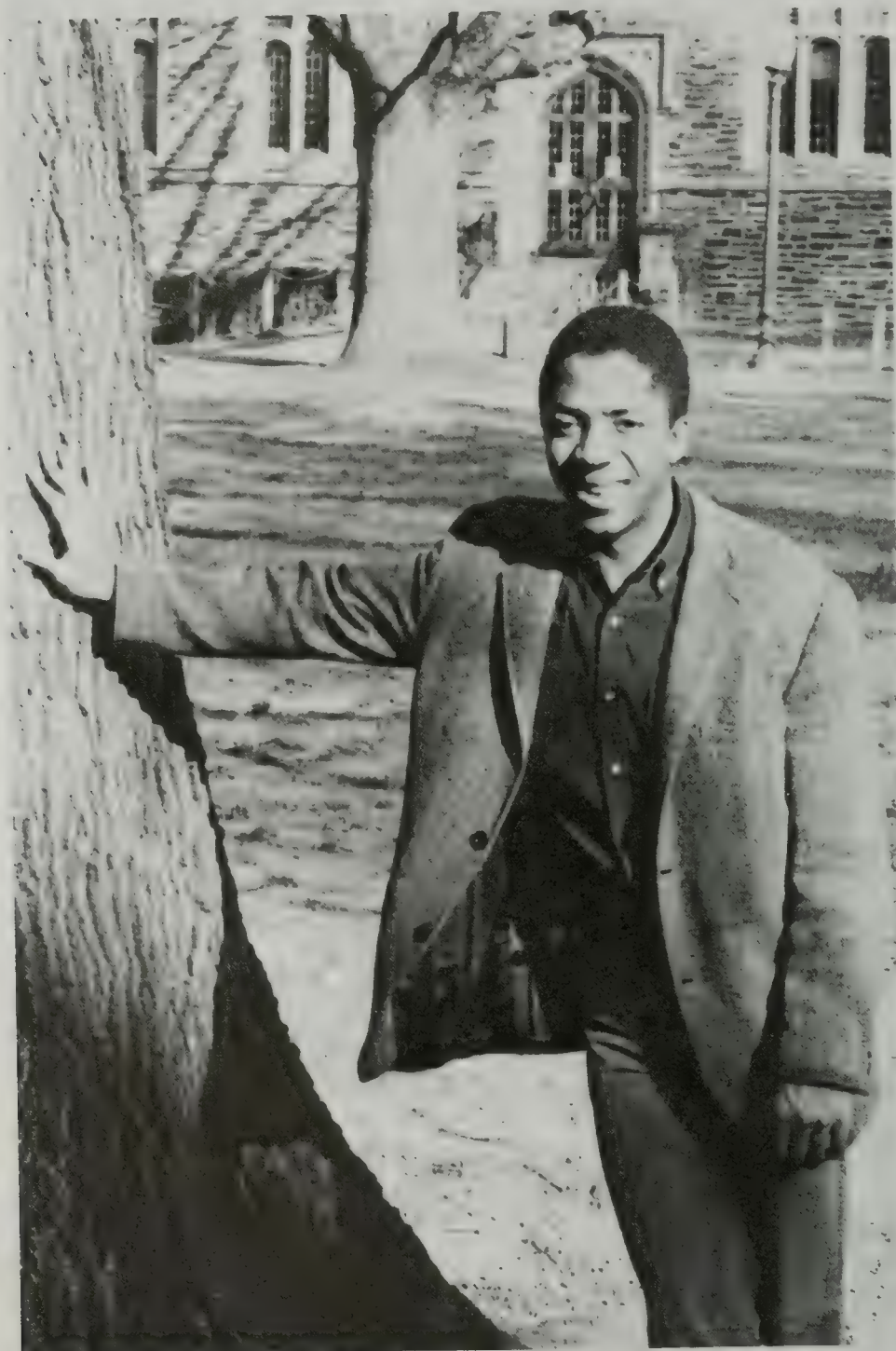
Office of Alumni Affairs

Laney Funderburk, Director, 614 Chapel Drive. The Alumni Affairs Office initiates and sponsors a variety of activities and services linking Duke students with one of the University's best resources—its alumni. The freshman class directory, one of the most closely read booklets freshmen receive, is sponsored by the General Alumni Association and is compiled by Alumni Affairs. Homecoming Weekend in the fall, one of the traditional alumni-student activities, is another undertaking of the Alumni Affairs Office. A staff person has the responsibility to serve in an active role in all student-related activities, and this person works closely with Student Alumni Relations Committee (SARC), which is involved in organizing and supervising the Duke Network and the Conference on Career Choices. These programs are designed to strengthen student-alumni relationships and increase student involvement generally. Many get-togethers are planned for new and current students both on and off the campus. A member of the alumni staff serves as associate with the senior, junior, and sophomore classes to assist their officers with class activities and projects.

Several ASDU leaders and class officers serve on the Board of Directors of the Duke University General Alumni Association and its committees. *Duke Magazine*, published by Alumni Affairs, is offered by subscription to parents of students.



Academic Information



Miscellaneous Academic Policies and Procedures

PROCEDURE FOR RESOLUTION OF STUDENTS' ACADEMIC CONCERNS

Trinity College of Arts and Sciences provides formal educational opportunities for its students under the assumption that successful transmission and accumulation of knowledge and intellectual understanding depend on the mutual efforts of teachers and students. Ideally, the college offers a range of learning experiences in which students strive to learn enough to be able to test their ideas against those of the faculty, and faculty, through the preparation of course materials and the freshness of view of their students, discover nuances in their disciplines.

Sometimes, however, student-faculty interrelationships in certain courses give rise to concerns that, for whatever reason, can inhibit successful teaching and learning. When this occurs students often need assistance in resolving the issues.

The faculty and administration of Trinity College of Arts and Sciences attempt to be genuinely responsive to all such matters and a student should not hesitate to seek assistance from faculty and administrative officers in resolving problems.

Questions about course content, an instructor's methods of presentation, the level of discourse, criteria for evaluation of students, or about grades or administrative procedures in a course, should be directed to the instructor of the course. If a student believes that productive discussion with the instructor is not possible, courtesy requires that the instructor be informed before the student refers questions about the course to the Director of Undergraduate Studies or, in his or her absence, to the Chairman of the department. If a student's concern involves a departmental policy rather than an individual course, the student should first confer with the Director of Undergraduate Studies in the department. A list of the names, addresses, and telephone numbers of the various Directors of Undergraduate Studies can be found in the University Directory. Staff members in the department offices can assist in arranging appointments with the Directors. When necessary, Directors of Undergraduate Studies may refer students to the department Chairman.

A student in doubt about how to proceed in discussing a particular problem, or who seeks resolution of a problem, is encouraged to confer with an academic dean of Trinity College.

In those exceptional cases where a problem remains unresolved through informal discussion, a formal procedure of appeal to the Associate Dean and Dean of Trinity College of Arts and Sciences is available. A student may initiate this more formal appeal procedure by bringing his or her problem—with assurance of confidentiality, if requested—to the attention of the Associate Dean of Trinity College of Arts and Sciences,

who will request information about the nature of the issue and about the earlier efforts made to deal with it. The Dean of Trinity College will be informed about the situation.

Statement on Sexual Harassment of Students

Definition. Sexual harassment in an academic environment is understood to be the intentional misuse of authority by a faculty member or an administrator by conduct focusing on the sexuality of a student in the academic context.

Examples. Sexual harassment can take a variety of forms, from verbal suggestion or innuendo and repeated physical overtures to requests for sexual relationships accompanied by implied or overt threats of inducements concerning a student's grades, recommendations, academic progress, or professional standing.

Policy. Sexual harassment may be egregious or less serious. Regardless of degree, it abuses academic relationships and has no place in the university. Appropriate sanctions will be imposed. Sexual harassment may rise to the level of misconduct justifying dismissal.

Procedures. 1. The Provost will appoint a committee consisting of two faculty members, two students, and two administrators, with an equal number of men and women. The terms of service will be for two years, renewable twice, and the terms will be staggered. In addition, he will appoint a professional counselor as a staff member of the committee. The Executive Committee of the Academic Council will nominate the faculty members of the committee; the Provost will select two students, one male and one female, from a slate of nominations submitted by ASDU and by the Graduate and Professional Students Council. After consultation with the Executive Committee of the Academic Council, the Provost will appoint the two administrators from the ranks of those administrators who are not academic deans nor have reporting relationships to academic deans. They might, for example, be appointed from the Office of Student Affairs or from the Office of Counseling and Psychological Services.

The Executive Committee of the Academic Council, after consultation with the student organizations, will nominate one of the two faculty members to chair the committee. The chairman should be encouraged to accept the appointment for at least two terms.

2. The names and office numbers of the members of this committee shall be publicized, and *students shall be invited to discuss with any member of the committee any incident that a student perceives as sexual harassment*. Committee members will inform the chairman, when it appears appropriate, of such contacts and may discuss the incident informally with other members of the committee.

3. The chairman shall convene the committee if further action is considered necessary.

a. Prior to the time the committee determines whether a complaint should be formally investigated, one or more members of the committee may discuss the complaint with the faculty member or administrator without in any way disclosing the identity of the complaining student.

b. Committee members (or the committee) in discussing the complaint with the student should offer counseling services through the committee and should explain the options of mediation and resolution and fact-finding for determining probable cause. After the initial discussions, the committee member (or the committee) and the student may come to the conclusion that sexual harassment did not, in fact, occur, and the case shall be dropped.

c. After the discussion with the complaining student and any informal discussion with the faculty member or administrator, the committee shall determine whether to initiate a formal investigation of the complaint. If the committee decides to initiate an investigation, the accused faculty member or administrator shall be informed and the name of the complaining student disclosed to him or her.

d. In carrying out the investigation, the involved faculty member or administrator shall be apprised of the evidence that had been submitted to or gathered by the committee. The faculty member or administrator shall be given a fair opportunity to respond to such evidence as well as to present any additional evidence that the faculty member considers relevant.

e. After this investigation the committee may find that the incident does not warrant further proceedings or may resolve the dispute in a manner that is accepted by all parties involved. If the dispute cannot be resolved in one of these two ways, and the committee has found probable cause, the committee shall forward the information it has collected, a report summarizing this information, and the committee's evaluation of the information to the dean of the school of the accused faculty member or administrator.

4. The dean, after considering the information presented to him by the committee, shall determine the action which he or she considers appropriate. The dean shall inform the faculty member or administrator by letter of the dean's decision and of the faculty member's right to a hearing. If the faculty member does not request a hearing, the letter shall become a part of the faculty member's file and the specified corrective action shall be taken.

5. If the complaining student or the faculty member requests a hearing, a hearing shall be held to determine whether the faculty member had engaged in sexual harassment.

a. The hearing shall be held before the Provost or his designate who shall determine the procedures to be followed. If the Provost finds that no sexual harassment occurred, no action shall be taken against the faculty member and no record of the complaint shall appear in his file. If the Provost finds that sexual harassment occurred, he shall so inform the parties and determine any corrective action to be taken. The decision of the Provost may be appealed, by either the student or the faculty member, to the President.

b. If the corrective action determined by the Provost is dismissal, a further hearing shall be conducted in accordance with the procedures for cases involving faculty dismissal (See Appendix C, Section V).

Records. 1. The chairman of the committee shall keep records of each complaint. These records should, at least, include (1) the sex of the complaining student and faculty member or administrator involved, (2) the student-faculty or student-administrator relationship, (3) the school or department involved, (4) the nature of the complaint, and (5) the action of the committee. These records are for the internal use of the committee only; they should be retained in the committee files for ten years and then destroyed.

2. The committee shall prepare an annual report of its activities, which shall retain complete confidentiality as to the names of persons involved. This report will be sent to the President, the Provost, the Executive Committee of the Academic Council, ASDU, and the Graduate and Professional Students Association.

Residential Information



Residential Facilities

TRINITY COLLEGE OF ARTS AND SCIENCES THE SCHOOL OF ENGINEERING

Within the framework of the regulations of the community, individual students are responsible for their own decisions and choices. The University adheres to the premise that social regulations and activities of the various living groups must be supportive of the general welfare of the total University community and must be protective of the interests of individuals and minority viewpoints within each living group. Most of these regulations are enforced by the members of the community. In addition to the social regulations formulated by each living group, there are certain policies specified by the University that apply to students living within the residence halls and pertain to the safety and security of students and the orderly functioning of the dormitories. Any student or group of students may recommend a change in the regulations by presenting a proposal to the Residential Policy Committee, an advisory committee on matters of housing to the Dean for Residential Life.

The residential facilities of Trinity College and the School of Engineering are available to all full-time single undergraduate students who have been in continuous residence since their matriculation (this includes transfer students) as well as to students on leaves of absence or off-campus, provided they have filed the appropriate papers by established deadlines to the Housing Coordinator in the Office of Residential Life. Duke University residential facilities include residence halls and Central Campus Apartments. No undergraduate student may live in University housing for more than four years. Students who enroll in graduate or professional programs prior to receiving the undergraduate degree (such as "three/two" programs) are no longer eligible for undergraduate housing.

Freshman Residence Halls. Freshmen reside in all-freshman houses, the majority of which are coed, clustered on three of the four residential areas. The housing assignments are made by lottery to the houses; however, consideration is given to a student's preference for single-sex housing. Within the residence halls, single, double, and triple rooms are available. January freshmen live in all-freshmen houses as well as in some East Campus upperclass houses.

Upperclass Residence Halls. Upperclass students live in coed and single-sex residence halls on East and West Campuses. There are three types of living groups: independent or lottery, selective, and commitment. The independent living groups have their spaces filled by a general housing lottery. The selective living groups, which include the fraternities, select their members. The commitment houses select a third of their new

members from among the students who have made application to the house and the other two-thirds are lotteried from among the remaining applicants. Within all of the upperclass houses, except those located in Edens, there are triple as well as single and double rooms.

Central Campus Apartments. Located on Central Campus is a complex of University owned and operated apartments which accommodate over 750 undergraduate students. The remainder of the complex houses a cross-section of students from various schools and colleges of the University. This facility is part of the undergraduate lottery space, and assignment to this space satisfies the University's guarantee to provide eight semesters of housing.

Residential Regulations

(See also Student Life Section for additional information.)

In its residential policies and procedures, Duke University seeks to foster a climate of responsibility, initiative, and creativity on the part of individuals and living groups. A successful residential community is one in which students take pride in their physical surroundings and assume active responsibility for the maintenance of acceptable standards of public behavior in their living areas.

While students are indeed entitled to a general expectation of privacy within the confines of their own individual rooms (although, of course, extraordinary and compelling circumstances may occasionally require that this expectation be suspended), the University emphatically refuses to regard either students' immediate living quarters or their commons areas as privileged sanctuaries where students may act with absolute impunity and without regard to minimum standards of civility, decency, and respect for the rights of other members of the University community. Moreover, occupancy of an individual room or of a residence hall does not confer any proprietary interest or right of ownership on the part of the living group as a whole. The student and the living group are both properly viewed not as *owners* but as *custodians* of that living space (with all of its physical amenities) which has been assigned to them. And inherent in this custodial relationship, of course, is the right of the University to promulgate criteria governing the circumstances under which this relationship may be entered into, may be maintained in good standing, or may be terminated.

While the majority of problems incurred between or among roommates can be resolved by the students, with or without assistance; there are some cases in which a stalemate occurs. The Office of Residential Life will, in those cases, reserve the right to convene an arbitration board to resolve the problem. The decision of the board is final.

House Closing in Residence Halls with Security Systems. Some houses are locked by 12:00 A.M. or at an earlier time agreed to by the house membership. Each student must obtain an entrance card key for his/her house from the Service Office in his/her area. A deposit is charged to the resident's Bursar's account. The deposit is refunded if the entrance card key is returned within 48 hours after the student vacates the building. Entrance card keys are not to be loaned or borrowed.

Signing Out. There is no requirement that a student leave a record of his or her whereabouts if he or she leaves the Duke campus. However, in order that students can be located when needed in an emergency and in the interest of students' safety, it is recommended that students leave records of their whereabouts and anticipated time of return with the residential staff or with roommates when they are out of the residence hall.

Meetings in Residence Halls (use of Residential Lounge Facilities). Lounge facilities are provided within the residence halls for the use of those Duke University students living in the residential unit in which the lounge is located. Use of the lounge must conform to all regulations established by the University and individual units. Permission

for students or groups of students who are not members of the residential unit to use the lounges must be secured in advance from the House Council of the resident unit and should be reported to the Service Manager. Any use of lounges must be approved and registered with the House Council. The care of the facilities within the lounge areas is the responsibility of the residential unit. Any group given permission to use the lounges is responsible to the residential unit for any damages which might occur as a result of their use of the area. Housing Management will hold the residential unit responsible for damages or necessary cleaning.

Guests. Students may have overnight guests for reasonable periods of time subject to the specified residence hall visitation policies for each residential unit. However, continued use of a residence hall room or Central Campus apartment by person or persons other than those to whom the room or apartment is rented is prohibited. Overnight guests should not be entertained during examination periods. The Colleges reserve the right to ask a guest to leave if University policies and residence hall regulations are not obeyed or if complaints are received from members of the resident community. A student may not have guests over the objection of his/her roommate(s). Violation of any of these regulations could lead to nonresidents being charged with trespassing and residents (both guest and host) having their housing licenses revoked.

REGULATIONS AND JUDICIAL BOARDS FOR RESIDENTIAL UNITS

As provided under the judicial structure of the University, each residential unit may have a judicial board which has jurisdiction over most offenses involving violations of regulations relating to dormitory procedures and social regulations. Information about residential judicial structures and procedures common to the undergraduate community appears in Appendix D.

HOUSING LICENSE

Prior to occupancy of space in a University residence hall or Central Campus apartment, each student must sign a housing license. Licenses for the residence hall and Central Campus Apartments must be filed with the Housing Coordinator in the Office of Residential Life. Refer to the appendices for copies of the residence hall license and the Central Campus housing license.

REVOCATION OF THE HOUSING LICENSE

Residence hall occupancy should be understood as a privilege which is to be maintained under certain standards. This includes abiding by the terms of the housing license as well as upholding general standards of civility, decency, and respect for the rights of other members of the University community.

All terms of the housing license (see Appendix A for copies of the residence hall and Central Campus licenses) are designed to protect the health and safety of students and to provide for the comfort and privacy of students who have contracted to occupy University housing.

Any conduct which reflects a serious disregard for the rights, health, safety, and security of other occupants of University housing will be reason for revocation of this license and/or disciplinary action. Such conduct includes, but is not limited to, tampering with fire and security equipment or use/possession of firearms, weapons, and explosives. When a license is revoked due to disciplinary action, the University will not refund any portion of the payment for the semester in progress.

In addition to violators of specific housing license terms, a student who has been a repeated violator of housing terms and/or University regulations or who has shown blatant disregard for others is subject to eviction.

HOUSE DUES POLICY

Duke University has a strong commitment to a residential community supportive of a good educational experience. The activities of each residential house which contribute

to this experience are possible only through a financial commitment of the members of that house. Therefore, students living within a residential hall are obliged to pay the dues upon which the residents agree. (It should be noted that the University has taken this obligation into account when determining a student's financial aid package.)

1. It is required that house dues be agreed upon by at least a two-thirds majority vote of the living group membership in a well-announced meeting attended by at least three-fifths of the members or through a poll of all residents. Further, it is understood that this is a private matter between the individual and his/her living group. Each living group is required to set dues to a \$25 per person minimum for each semester.

2. Students who move from one living group to another can expect a prorated refund from their former living group and are expected to pay prorated house dues to the new living group.

3. Students who have accepted membership in a particular living group in which they continue to reside and, at a later time, accept membership in another group shall be obligated to pay dues to both groups unless a written agreement is negotiated with the groups involved.

4. Independents involuntarily placed in fraternity sections or fraternity men involuntarily placed in independent sections are not obligated to pay house dues. They may choose to pay social dues if invited to do so by the fraternity or the independent house; however, they are obligated to pay a small annual fee (\$5) if they use the commons room and television and must help with normal expenses due to damage in common areas.

5. Should a selective living group be unable to fill its assigned space with its members, up to 10 percent of the space (with approval of the Office of Residential Life) may be allocated to "affiliate" members who have a contractual financial arrangement with the selective group. Such persons have full social privileges within the selective group and are often referred to as "friends of the house."

ASSISTANCE FOR LIVING GROUPS IN COLLECTING DUES

The Office of Residential Life will assist in collecting dues *only if* house treasurers submit to that office a list of those delinquent in payment by September 30 for first semester dues and February 3 for second semester dues along with a statement indicating that portion of dues which is used to buy alcohol (the Office of Residential Life will not assist in the collection of living group dues which is used to purchase alcohol). Also, in order to have the assistance of that office in collecting dues, house treasurers *must* attend the Student Affairs Workshop for House Treasurers during the fall semester.

Appeals. Every house must make available to all students the option of appealing in-house for a waiver of dues. Although some groups prefer to have such appeals heard by the House Judicial Board, it is recommended that appeals be heard in a closed meeting of the appellant and the House Treasurer (and, perhaps, House President) with the Resident Adviser as observer and adviser. The contents and decision of such appeals are to be held in the strictest confidence. When a waiver is granted, it may be assumed unless otherwise specified in the decision, that the appellant retains all social privileges in the house. The hearing panel may recommend full payment, installment payment, or nonpayment. Decisions of the hearing panel may be appealed to the Residential Judicial Board whose decision is final and binding.

N.B. Joining a fraternity or a sorority, participating in other organizations, taking no interest in activities of the living group, or deciding to spend one's discretionary funds in another way do not constitute valid grounds for exemption from paying dues.

Sanctions. Graduating seniors failing to pay living group dues which have been properly established will be referred to the Residential Judicial Board for adjudication. Other students failing to pay living group dues which have been properly established must move to another location (a) determined by the Office of Residential Life at the end of the fall semester or (b) determined by the general lottery at the end of the spring

semester for the following fall term, whichever is appropriate. If entering the lottery in the spring, such students will be grouped behind all other students entered into the lottery.

LIVING OFF-CAMPUS

Students above the freshman level who wish to live off campus should file the appropriate forms with the Housing Coordinator.

If a student plans to live off campus and return to university housing at a later time, he/she *must* request by the deadlines published by the Office of Residential Life that his/her housing deposit be held up to one calendar year, after which it would be refunded and the housing guarantee revoked. Such requests should be made by completing the appropriate form in the Office of the Student Housing Coordinator in the Office of Residential Life.

POLICY FOR REFUND OF RESIDENTIAL DEPOSITS, RENT PREPAYMENT, BOARD PAYMENTS, AND RENTS FOR RESIDENCE HALL STUDENTS

Residential Deposits. The one hundred dollar (\$100) residential deposit paid upon matriculation to Duke will be refunded if the Office of Residential Life is notified by the student prior to July 1 of his or her intent to move out of residence hall housing for the fall semester and by December 1 if cancelling for the spring semester.

Fall Rent Prepayment. The fifty dollar (\$50) rent prepayment will be refunded if the Office of Residential Life is notified by the student prior to the last day of spring semester classes of his or her intent to move out of residence hall housing.

Move from Residence Halls to Central Campus Apartments. Students who move from the residence halls to Central Campus Apartments will have their room rent payment credited to the Central Campus Apartment rent and will receive full refund of unused board payment (unused points) if the board contract is terminated at the time of the residence hall cancellation. Students also have the option of maintaining or changing the board contract at this time.

Cancelling a Residence Hall Assignment. Undergraduate students who wish to move off campus, to move to the residence halls, to take a leave of absence, or to withdraw from the University should contact the Office of Residential Life to request cancellation of the contract. Request for cancellation due to a leave of absence or withdrawal from the University will be granted. A request for cancellation to move off campus or to the residence halls will be granted only if an eligible replacement (eligibility is determined by the Office of Residential Life) is found to move into the space created by the cancellation.

Undergraduate students who have been assigned a room who wish to cancel their assignment must notify the Office of Residential Life in writing. Students who cancel their assignments after the contract has begun will be entitled to a refund of the unused rent, the amount to be determined according to the date the keys are returned to the service office and/or the date Housing Management inspects the room and confirms that the space has been vacated. In any case a minimum of \$50 will be retained by the Department of Housing Management. Refunds of unused board payment (unused points) will be given if the board contract is terminated at the time of room cancellation.

FIRE SAFETY

Any living group or individuals planning a party on Duke University property which has a decorations such potential fire hazards as paper draping, hay, bamboo, etc., must obtain clearance for the use of decorations from the Safety Manager of the Duke Public Safety Office (684-5909). Approval from the Safety Office does not relieve a living group of its responsibility for prompt clean-up or of its financial responsibility for damages (including any excess cleaning required by Housing Management). Open fires are not permitted on Duke University property except as approved by the Safety Office.

PRIVACY OF STUDENT'S ROOMS AND APARTMENTS

Students who reside in University residences are assured the privacy of their rooms and apartments and freedom from the admission into or search of their rooms or apartments by any unauthorized persons; however, the University is obligated to maintain reasonable surveillance of the residential areas to promote an environment consistent with the aims of an academic community. To foster these conditions the following regulations are now in effect:

1. Housing Management personnel may enter assigned rooms or apartments at reasonable hours on days designated by either bulletin board notices or similar prior notification for the purpose of carrying out their assigned tasks and functions. Other personnel may enter assigned rooms when accompanied by proper authorization from the appropriate administrative official (see section 2 c). In the case of residence halls, this notification, when feasible, shall be posted on the residence hall bulletin board stating what dates rooms will be entered. Maintenance personnel may enter assigned rooms or apartments at reasonable hours for the purpose of carrying out their assigned tasks and functions. Housing Management personnel are expected to inspect the maintenance work done within twelve (12) working days to validate satisfactory completion of such work. Employees in the above categories may report on the condition of University facilities and equipment, on violations of the housing license, or on situations which jeopardize the overall health and safety of the residence hall population. All personnel in the above category shall leave written notice stating the purpose for entering. Upon receipt of this notice the occupant may contact the area Service Office to discuss the entry. The written notices must, as well, advise the occupant that subsequent investigation or repair may henceforth occur at any time during the normal work week of Housing Management or maintenance personnel. (Note: General rule or enforcement procedures will not be founded on information relating to the personal contents of rooms from personnel mentioned unless such contents are specifically prohibited by University regulations or by the housing license published in advance.)

2. No person, with the exception of those listed in section 1 above, shall enter assigned rooms or apartments except under the following conditions:

- a. consent of the occupant(s); or
- b. presentation of a properly drawn legal search warrant; or
- c. presentation of a written authorization from the Dean for Residential Life, the Dean for Student Life, or their representatives, as appropriate; or
- d. emergency situations or immediate threat to preservation of the building and the safety of occupant(s) and/or the residential population.

3. Reports made as a result of inspections related to physical facilities and/or furnishings will be handled by the Department of Housing Management in accordance with the existing residential regulations as published in bulletin form by the University.

4. Written authorization from the deans must specify the reasons for believing such a search is necessary, the objects sought, and the area to be searched.

5. The request for a search, if approved by the designated authorities, shall be kept in records with the authorization until the time of the student's graduation and shall be available to the student for examination. The records will be kept completely separate from the student's permanent record. Should the search figure in any trial proceeding within the University, the authorization shall be attached to the trial record; if no action is taken following an authorized search, notation of this fact shall be filed with the authorization. No action shall be taken in regards to objects found but not specified on the authorization of the search.

In the absence of a legally drawn search warrant, no general searches shall be conducted by University personnel except with the possession of the written authorization of all these above-mentioned deans, stating the reasons for the search and the specified objects sought, or under circumstances deemed to be of extreme emergency by these deans or the officer on each campus in charge of maintenance.

CARE OF RESIDENCE HALL ROOMS AND ADJACENT CAMPUS AREAS

Though limited custodial services for common use areas are available, a student is responsible for the care of his or her room and furnishings and is required, as a condition of occupancy, to keep the room reasonably clean and orderly. The University reserves the right for personnel to enter at reasonable hours to inspect the condition of any student's room in accordance with the current privacy policy.

Nails, screws, tacks, or adhesives on any walls or woodwork of the residence are prohibited. The utilities, wiring, locks, or screens should not be altered in any way. (See Housing License for more detailed information.)

Games and other activities which may damage lawns or shrubbery adjacent to residence halls are not permitted. Defacing or painting buildings and adjacent installations, sidewalks, trees, and shrubbery is prohibited.

No student shall enter custodial, utility, or maintenance spaces within the residence halls unless accompanied by University-authorized custodial or maintenance personnel. Use of roof areas is prohibited.

Complaints and requests pertaining to maintenance and services should be reported to the Service Office in the appropriate residential area.

Housekeeping services such as cleaning the bathroom, sweeping, mopping, vacuuming, and trash removal will be provided on weekdays during the academic year (excluding holidays) in common areas of the residence halls. Cleaning of individual rooms is the responsibility of the resident(s).

Living groups are expected to take responsibility for cleaning up after parties and other events that create extraordinary messes. Any extraordinary cleaning that must be performed may be charged to the living groups. In as much as housekeeping time spent on extraordinary clean-up is time spent away from the normal duties of keeping the buildings clean, extraordinary clean-up may be deferred until such time as the normal housekeeping tasks are complete. Extraordinary cleaning is generally defined as clean-up of (1) excessive trash, (2) conditions that present hazards to people, furnishings, or buildings, such as broken glass, standing liquids, flammable trash and health hazards, and (3) other conditions that require unusual effort, such as removal of eggs, shaving cream, etc. A cleaning supplies closet has been designated for each living group's use. Members of the living group have 24-hour access to and responsibility for the cleaning equipment provided by Housing Management. Each closet contains a mop, mop bucket, dustpan, soap, toilet tissue, Barf Clean, and trash bags. Any living group charged with a clean-up by Housing Management will be sent a warning letter by Residential Life. If a group receives a second charge in the same semester, that group will come before the Residential Judicial Board for adjudication. A group's record will be cleared at the end of the fall semester unless it has appeared before the Residential Judicial Board because of the clean-up policy. All records will be cleared at the end of the academic year.

All living groups are responsible for cleaning trash beyond the normal amount on the grounds adjacent to their residence halls. Failure to have the area cleaned before 10 A.M. the day after an event will result in a minimum charge of \$25 to be determined by the Physical Plant office; however, the enforcement procedure indicated in the above paragraph is also applicable to failure to clean grounds adjacent to the residence halls.

Extra trash containers are available from the Physical Plant office by calling 684-3611 at least two days prior to the event.

Damage Charges. Students will be held responsible for damages that occur in their rooms and apartments. Living groups will be charged for damage to public areas of the Houses. Students and living groups will be billed and may appeal charges in accordance with procedures published by the Department of Housing Management. (See the housing licenses and handbooks for information. Additional information may be obtained from the Department of Housing Management.) Living groups similarly will be charged for damage to public areas, equipment and furnishings, sidewalks, shrubbery, and lawns; repair costs will be billed to the students in accordance with procedures established by

the University after consultation with the Residential Policy Committee. At the end of each academic year, outstanding living group charges will be divided equally among the group's members and charged to their Bursar's accounts. Littering which causes excess work to clean will be charged to the students and living groups involved.

During the fall semester 1987, the damage policy outlined below was approved by the Residential Policy Committee (RPC) in consultation with ASDU, IFC, UHA, and the Council of Freshman Presidents.

Periodically, the Department of Housing Management will supply the Office of Residential Life with the statistics necessary to calculate the damage index which is formulated as follows and reflects the number of damage dollars per resident:

$$\frac{\$ \text{amt. of invoice} + (\# \text{ incidents} \times \$100)}{\# \text{ of residents}}$$

Once the damage index is calculated, it is compared to a standard damage index of 3. This figure may be reviewed periodically and adjusted to reflect changing behaviors that result in a lowered standard index.

If a living group's damage is:

- 2 • standard index (=6), the group will receive a probation letter that will remain in effect for the remainder of the academic year.
- 3 • standard index (=9), the group will be denied use of its commons room for a weekend, defined as Friday afternoon to Monday morning. When a commons area is closed, the space may not be used for any purpose during that period.
- 5 • standard index (=15), the group will be denied use of its commons room for three weeks.
- 7 • standard index (=21), the group will be denied use of its commons room for five weeks.

N.B. A living group which previously has been denied use of the commons room for five weeks and fails to reduce its damages to the standard index will subsequently be referred to the Residential Judicial Board; however, a group may be referred to the Residential Judicial Board no more than two times. The third time the group will appear before a Hearing Panel to determine if dissolution of the group is justified.

Indices will be recorded month by month and cumulatively. If a group is sanctioned one month and fails to hold its damages to the standard level the following month, the sanction will be one level higher than the previous sanction. Cumulative damage indices will be compared with a cumulative standard level (standard index • month of the academic year) and sanctioned according to the above guidelines.

Any reported cases of necessary excessive cleaning of public areas, the cost of which is not levied against the living group, will be considered as another incident to be included in that group's damage index.

Storage. During the academic year, Housing Management provides storage for empty trunks and luggage without charge in the area designated for each residence hall. Students should consult their Service Offices for information. All items placed in storage for the academic year must be removed prior to the last day of final examinations for the spring semester. Nonstudents and students residing off-campus may not store personal effects at any time in the residence hall storage rooms. Items placed in storage must have a Housing Management storage tag and be well marked with owner's name tag and permanent mailing address. Receipts given at time of acceptance must be surrendered by the student on withdrawal of storage items. Items left in storage rooms at the end of the spring term for which summer storage fees have not been paid will be disposed of in the best interest of the University.

The Department of Housing Management provides space for storage of personal or group-owned items during the summer months on a fee paid basis and in approved areas only. Any personal effects or group-owned items left in the residence halls not in approved storage areas (including, but not limited to, commons rooms, closets, and above suspended ceilings) may be disposed of without notice or reimbursement to the owner. Designated closets have been made available to some living groups for storage of group-owned items such as file cabinets, party supplies, and fraternal material. These closets may not be used by members of the living groups for storage of personal possessions. Housing Management is not liable for damage to or loss of stored living group items except as the fee paid storage terms allow.

LIVING GROUP BUILDING IMPROVEMENTS AND RENOVATIONS POLICY

Any alterations and/or renovations to residence halls must be approved by the Director of Housing Management.

Any living groups wishing to make permanent or attached alterations, additions, or renovations to residence halls must submit plans, drawings, and other related information to the Director of Housing Management for evaluation.

If approved, such alterations, additions, or renovations will be accomplished at the living group's expense. Housing Management will inspect the completed work to make sure approved materials and plans were used and that the quality of construction is acceptable. Any construction which does not pass inspection must be removed or corrected as directed by Housing Management and at the living group's expense.

Anything attached to the building will become the property of and maintained by Duke University. No reimbursement will be considered if the group is subsequently moved.

Any changes of a permanent or attached nature not approved through official channels may be removed at the convenience of the University and subsequent repairs made at the group's expense.

Any nonattached additions a living group wishes to make to the public areas of its residential hall (e.g., extra furniture, art work, portable bars) need not be submitted to the Director of Housing Management for approval so long as the items are truly portable. However, the living group should understand that Housing Management may require the group to remove (or may remove at the group's expense) any item which may damage the facility, hinder maintenance of the facility, or present a health or safety hazard. If the living group wishes to leave group items in the public areas of its residence hall over the summer, the group should get written permission from its Service Manager to do so. The living group is responsible for removing and storing all items which it does not have written permission to leave. Items left *without* written permission may be removed and disposed of at the group's expense. Items left *with* permission may have to be removed during the summer to accommodate summer users or maintenance projects. In such cases, Housing Management will take every precaution not to damage the item and to return it intact. However, should the item be damaged or lost, no reimbursement will be made to the group. Living groups are encouraged to seek their Service Manager's advice when considering nonattached additions.

BAR POLICY FOR RESIDENCE HALLS

See also "Living Group Building Improvements and Renovations Policy."

1. No permanently attached bars will be allowed in living groups (after 1981). Bars built in University facilities which are affixed in any way to the building or which are too heavy to be moved will be destroyed at the University's convenience and at the expense of the living group, including necessary repairs to the facility.

2. Only movable (not attached to floor or building) bars will be allowed. The bar should be able to be removed from the building without damage to the bar or to the building.

EXTERIOR SIGN POLICY FOR RESIDENCE HALLS

Exterior building signs identifying a living group will be permitted only in the immediate area of the residence. The sign must be provided by the group and approved jointly by the Director of Housing Management and the Dean for Residential Life. Only one sign per living group is allowed. Where two or more signs currently exist, any above the one allowed will need to be removed after reaching a point of disrepair.

All such signs will be mounted on the buildings by Housing Management at no cost to the group. Requests for sign approval and mounting should be made in writing to the Director of Housing Management and must include a sketch of the proposed sign, indicating proposed dimensions and colors, in ample time for approval before beginning to build the sign. Any repairs to existing signs must be approved by the Director of Housing Management.

RESIDENCE HALL BENCH POLICY

Only approved living groups may place benches on University property. Benches will be permitted only in the area immediately adjacent to a particular residence unit. The bench may be put in place by the living group as long as the dimensions are no larger than 12' in length, and 5' in height from the ground, and 6' in depth. Any benches cemented in the ground which need to be moved for any reason will be cut off at ground level and not replaced in concrete by the University. Any bench too large to move in one piece will be separated into manageable pieces and reassembled using existing lumber without reimbursement to the living group for damages. Every effort will be made to retain the integrity of each bench when it is necessary to move a bench; however, the University will not be responsible for replacing concrete footings or materials damaged as a result of a move. Living group benches may have to be moved temporarily (e.g., for Commencement or summer programming). The specific design, including sketches noting dimensions, and desired location of a living group's bench must be submitted in writing to the Dean for Residential Life and the University Architect at least three weeks prior to the desired construction date. Approval for a bench must be received from the Dean for Residential Life and the University Architect. Note: This policy is currently under review and may be changed for the 1988-89 academic year. Inquire at the Residential Life Office.

Annual Review of Residential Groups

The following statement of residential group standards and annual review is based on one initially drawn up by the Residential Life Committee to provide a mechanism for the continued improvement and support of the Duke living groups. The goal of this annual review is to support groups that have satisfactory residential programs and to aid groups which have deficiencies in improving their programs.

The specific terms of this program are as follows:

1. By the last day of March, each upperclass living group must file in the Office of the Dean for Residential Life the following information:

- a. a constitution of the governmental structure of the group
- b. a statement of the goals, standards, and proposed contributions to the residential program
- c. a list of activities through which its members attempted to accomplish its stated goals in the current year
- d. an outline of proposed activities for the following year

2. Early in the fall semester, the appropriate Dean(s) in the Office of Residential Life will meet individually with each living group president to go over the Annual Review Report which was submitted for their living group the previous spring. The purpose of these meetings is twofold: ;(a) to advise and inform the new house councils concerning the prior year's successes and failures in their living group's programming, and ;(b) to

introduce student leaders to the programs, funds, facilities and services which the Residential Life Office offers them in their programming efforts.

3. Early in the fall semester, the Dean for Residential Life will submit each living group's Annual Review Report to a special committee which the Dean will convene initially and which will be composed of the following:

- a. an ex officio representative of the Office of the Dean for Residential Life who will chair the group
- b. the President of ASDU or a representative
- c. the President of IFC or a representative
- d. the President of UHA or a representative
- e. the Chairperson of the Residential Judicial Board or a representative
- f. two faculty members appointed by the Dean for Residential Life, one each from Trinity College and the School of Engineering
- g. an academic dean appointed by the Dean of Trinity College

This committee will review and evaluate the program of each living group, examining in particular the following:

- a. attainment of stated goals
- b. quality of group's program
- c. disciplinary record
- d. academic and intellectual atmosphere.

The committee will then submit the results of its evaluation to the Dean for Residential Life. On the basis of the committee's recommendations, and subject to his approval, the Dean for Residential Life will send letters to each living group president informing him/her whether the group's program was determined to be outstanding, satisfactory, or in need of improvement.

4. After all living groups have received letters notifying them of the results of their review, the committee will meet with the President and one other officer of each of those living groups whose programs were determined to have been in need of improvement. The purpose of this meeting is to offer suggestions for correcting deficiencies in the overall program of the living group. They will be called before the committee again in the spring semester to report on the progress of the living group. If at the spring review a living group continues, in the judgment of the committee, to have an unsatisfactory program, the committee may recommend to the Dean that the living group be placed on probation for a given period of time, during which time the living group will be expected to correct the program deficiencies identified by the committee. At the end of the period of probation, the living group must appear before the committee for review. If the program is again judged to be unsatisfactory, then the committee will refer the matter to the appropriate person for further action (see "Responsibilities of Residential Groups" below). A similar review process will be implemented for the freshman houses in the fall of 1988.

Responsibilities of Residential Groups at Duke University

(See also "Annual Review of Resident Groups.")

Living groups are responsible for maintaining the standards and adhering to the regulations established by Duke University and adjudicated by the various judicial boards. If such standards and regulations are violated, a living group may be dissolved. The final decision regarding the continuation of a living group rests solely with Duke University.

Living groups may be placed on the status of "warning" by the Offices of the Dean for Residential Life or the Dean for Student Life because of behavior problems which are not considered to be serious enough for judicial action. Living groups which fail to correct the problems which caused the group to be placed on the status of "warning" or as a result of an infraction of University regulations more serious than what would normally result in a warning may be sent to the appropriate judicial board which may

recommend to the appropriate dean that a living group be placed on "probation." The status of probation shall be imposed for a period of not longer than two semesters.

Living groups may be placed on "interim suspension" by the Offices of the Dean for Residential Life or the Dean for Student Life and the matter forwarded to the appropriate judicial board for violation of the status of probation, for serious infractions of University regulations, for repetitive failure to submit required information to the University, for continued behavioral problems, or for continued failure to meet financial obligations. The appropriate judicial board then may recommend to the appropriate dean that a living group be placed on suspension. Any judicial body on its own initiative may also recommend suspension of a living group to the appropriate dean. It shall be the decision of the Dean as to whether a living group is placed on suspension and that decision may be appealed to the Vice-President for Student Affairs. The Vice-President's decision shall be final and binding. During any period of suspension or interim suspension, the suspension shall be for a period of no less than two weeks.

A living group alleged to be in violation of the terms of a suspension or alleged to have committed a violation of University regulations deemed serious enough by the Dean for Residential Life or the Dean for Student Life to so warrant will have a special dissolution hearing conducted by the Office of the Dean for Residential Life. In addition, no living group will be placed on suspension for consecutive semesters; a living group committing an offense that might otherwise be cause for suspension during the semester following a suspension will also have a special dissolution hearing conducted by the Office of the Dean for Residential Life. The dissolution hearing panel shall be composed of three representatives from the Division of Student Affairs, the President of the Interfraternity Council, the Panhellenic Council, or the Upperclass House Association as appropriate, and a faculty member. The panel shall report its recommendation to the Dean for Residential Life. It shall be the decision of the Dean as to whether a living group is dissolved and that decision may be appealed to the Vice-President for Student Affairs. *The Vice-President's decision shall be final and binding.*

Housing Policies for Selective Living Groups and Their Members

The following housing policies for selective living groups are gathered together from the February 26, 1981 Report of the Student Affairs Trustee Committee in response to the Residential Life Section of ; *Directions for Progress*; "Social Fraternal Organizations Policies and Procedures, Duke University, July 1, 1979;" and "Residential Life: Policies and Procedures for Undergraduate Students, 1985-86."

Duke University is under no obligation to supply housing to any fraternity or sorority at the time of installation on the campus. While the Dean for Residential Life will consider the requests for housing from recognized fraternities or sororities, the University is under no time constraints to provide such housing.

In accordance with the guidelines adopted by the trustees in 1981, there is to be no greater number of fraternity living groups chartered. Furthermore, there is a 50 percent ceiling on the number of upperclass bed spaces on campus allocated to men and women's selective living groups (the number of selective bed spaces for men would be no more than 50 percent of the upperclass men's spaces on campus).

POLICIES REGARDING SPACE ALLOCATED TO AND FILLED BY FRATERNITY LIVING GROUPS

1. All fraternities are expected to fill 100 percent of their sections' bed spaces with initiated members of the fraternity ("brothers"). N.B. Only initiated brothers count toward fulfillment of this housing obligation; "friends of the house" (see 2b. below) and pledges do not count toward fulfillment of this obligation.

2. If a fraternity fails to fill 100 percent of its section's bed space with initiated members, but does fill 90 percent or more of its bed space with initiated members, the following rules apply:

a. the Office of Residential Life may elect to use any open spaces to house fraternity men from other fraternities;

b. if the Office of Residential Life does not elect to house fraternity men of its choosing to fill the unoccupied spaces, the fraternity may fill its unoccupied spaces with "friends of the house;" i.e., independent men who, upon mutual agreement with the fraternity, choose to live in the fraternity section, pay the dues required of them by the fraternity, and have social privileges within that selected group.

3. If a fraternity fails to fill 90 percent of its section's bed space with initiated members of the fraternity, the following rules and procedures apply:

a. the Office of Residential Life may, at its discretion, convene hearings to review:

i. the fraternity's continued presence in its current section and the question of relocation to a smaller section;

ii. the fraternity's continued presence in any University housing and the question of placing the fraternity in nonresidential status; or

iii. the fraternity's continued recognition as a living group and the question of revocation of the fraternity's charter.

4. Should the number of members exceed the space in the allocated section, the excess members (to be determined by the living group) would find it necessary to be assigned space in another fraternity section which has available space, to move to proportionately allocated Central Campus Apartment space, or to move off campus.

5. Rooms in selective houses that are identified by the Office of Residential Life as being large enough to be expanded from singles to doubles or doubles to triples may be so expanded upon election by the selective group or by institutional need as may be determined by the University.

6. Each selective living group is required to submit to the Housing Coordinator in the Office of Residential Life before November 15 (for spring semester) and February 15 (for fall semester) a list of eligible initiated members who will be living in the section for the following semester.

POLICIES REGARDING WHERE MEMBERS OF FRATERNITY LIVING GROUPS MAY RESIDE

1. Members of a fraternity living group may reside only in the section of residence halls allocated to their group unless the number of members exceeds the space.

2. Any members unable to live in their section because their living groups have more members than beds, must either be assigned space in another fraternity with available space, must move to proportionately allocated Central Campus Apartments, or must move off campus. Those students moving off campus have the option of retaining their residential status if they arrange with the Housing Coordinator in the Office of Residential Life to have their housing deposits held for reinstatement in housing when space within the living group becomes available.

POLICIES REGARDING SPACE ALLOCATED TO AND FILLED BY INDEPENDENT SELECTIVE LIVING GROUPS

1. All independent selective living groups are expected to fill 100 percent of their sections' bed spaces with members whom they select.

2. If the group fails to fill 100 percent of its section's bed spaces with members, the Office of Residential Life may, at its discretion, use the open spaces to house other students.

3. If the group fails to fill 90 percent of its section's beds spaces with members:

- a. the Office of Residential Life may, at its discretion, permanently reallocate any or all empty spaces to other students
- b. the Office of Residential Life may, at its discretion, convene hearings to review:
 - i. the living group's continued presence in its current section and the question of relocation to a smaller section;
 - ii. the question of whether or not to change the selective living group to nonselective status by which students are then assigned to the section by the Office of Residential Life.

4. Rooms in selective houses that are identified by the Office of Residential Life as being large enough to be expanded from singles to doubles or doubles to triples may be so expanded upon election by the selective group or by institutional need as may be determined by the University.

5. Each selective living group is required to submit to the Housing Coordinator in the Office of Residential Life before November 15 (for spring semester) and February 15 (for fall semester) a list of eligible members who will be living in the section the following semester.

GUIDELINES FOR INDEPENDENT SELECTIVE HOUSES*

1. (A) New selectees for Selective Houses should be bound for a minimum two-year commitment.**

(B) Residents who break the two-year minimum commitment to the house to re-enter the lottery be relegated to the very bottom of the lottery, after sophomores.

(C) Semesters taken 'on leave of absence' or study programs away from Duke's Durham campus will not be considered in violation of the two-year commitment and will be counted as part of the two-year commitment.

2. As with other selective houses (i.e., fraternities), independent selective houses will be required to fill 90 percent of their bed space.

3. Independent selective living groups should adopt and maintain at least one charity, volunteer commitment or service project that is uniquely their own.

4. Independent selective living groups should run a satisfactory level of cultural and educational programs each semester.

5. Independent selective houses should maintain strong intramural sports and social programs, and whenever possible, look to interact with different groups on campus.

6. All independent selective (and for that matter commitment houses) must maintain their status as active members of the UHA.

7. Independent selective houses should choose a member of the Duke Faculty or administration who agrees to serve as the dorm's advisor.

8. If, after review, a selective living group terminates a student's membership in the house, then that student may reenter the regular lottery without penalty. Review and any terminations are to be completed no later than February 15, to facilitate the housing office's administration of the spring lottery.

*These guidelines were prepared and submitted by the Residential Policy Committee and adopted by Dean Richard L. Cox, January, 1987.

**This commitment may be amended by the Residential Life Office for independent selective houses with academic sponsors. (September, 1987; Residential Life Office)

GUIDELINES FOR INDEPENDENT SELECTIVE HOUSES WITH ACADEMIC SPONSORS*

1. Adherence to the Guidelines for Independent Selective Houses (see page 38).
2. Adherence to housing deadlines, policies, and procedures as published in the *Bulletin of Information and Regulations*, as decided by the Residential Policy Committee, and as outlined in the publication *Residential Life: Housing Assignment Policies and Procedures for Undergraduate Students*.
3. Adherence to the Annual Review Committee policies and guidelines (see page 34).
4. Some component of the academic program of the living group must take place in the residence hall; e.g., house courses, colloquia, faculty/student receptions, etc.
5. Some educational programming sponsored by the living group must be open to the entire community.
6. The programming conducted in the residence hall should be supported by the living group member dues as well as by financial contributions from the academic department sponsors and the Residential Life programming fund.
7. Resident Advisers will be required and will be selected through normal procedures with input from the academic sponsors.
8. Sponsors of the program must clearly state in the application materials their expectations and requirements of the students.

*Living groups such as the Language House and the Women's Studies House which are sponsored by academic departments.

Student Life



Duke University expects and requires of all its students full cooperation in developing high standards of scholarship and conduct. Each student is subject to the rules and regulations of the University as currently in effect or, from time to time, are put into effect by the appropriate authorities of the University.

Any student, in accepting admission, indicates his/her willingness to subscribe to and be governed by these rules and regulations and acknowledges the right of the University to take such disciplinary action, including suspension or expulsion, for failure to abide by the regulations or for other conduct adjudged unsatisfactory or detrimental to the University.

Responsibility for prescribing and enforcing rules and regulations governing student conduct rests ultimately with the Board of Trustees of Duke University, and, by delegation, with administrative officers of the University and of the schools and college. In the undergraduate college and schools, as well as in the University as a whole, many of these rules have been established over the years by cooperative action between students and administrative officers, and in the case of some rules, with participation of faculty members as well. Representative student organizations, such as student governments and judicial boards, and more recently, community-wide bodies of students, faculty, and administrators, have initiated academic and nonacademic conduct; and these proposals have been accepted by colleges and University officers and have become a substantial, if not all-inclusive, body of rules governing student life at Duke.

Similarly, the enforcement of rules in the undergraduate schools and college has traditionally been a cooperative endeavor of students and administrative officers, as well as faculty members who have participated in review and appeals committees and have advised with college and University officers about appropriate standards and procedures in such matters. The judicial structure of the University consists of a University Judicial Board, a Judicial Board for each of the communities within the University, and a Judicial Board for the residential units.

The judicial structure formalizes the tradition of shared participation by various members of the University and college community. Its viability, however, is dependent upon a mutual recognition by all members of the community of the need for high standards of scholarship and conduct, a willingness to exercise the personal and corporate responsibilities that accompany such recognition, and an appreciation of the different roles and responsibilities played by various members who participate in the life of the community. This last factor relates particularly to the role of students in determining and supporting high standards. In addition to the agreed upon monitoring and enforcement procedures outlined, the University administration reserves the right to intervene as needed.

If you have any questions concerning University regulations, the judicial structure or procedure, contact Vice-President William J. Griffith (684-3737), 106 Flowers, Dean Sue Wasiolek (684-6488), 109 Flowers; or Dean Richard Cox (684-6313), 209 Flowers.

The Undergraduate Community

Students in Trinity College and the School of Engineering constitute an undergraduate community whose members are subject to the Undergraduate Community Code. Violations of the code and certain University regulations are adjudicated before the Undergraduate Judicial Board, composed of representatives of the student body, the faculty, and the administration. The constitution of the board and the procedural safeguards and rights of appeal guaranteed to students are set forth in Appendix C. Also provided is an alternative procedure for hearing certain cases by the Dean for Student Life alone or by that officer's appointee as well as an appeal procedure. The judicial code which follows was drafted and approved by the Judicial Review Committee during the spring semester, 1980 and amended during the spring semesters, 1982, 1983, and 1988.

Supremacy of State and National Law. On November 21, 1852, the General Assembly of North Carolina amended an act to incorporate Union Institute in order to create a Board of Trustees in perpetuity for Normal College then located in Randolph County. The amended act provided that the trustees could grant degrees and "do all other things for an institution of learning not inconsistent with the laws of this State and of the United States." The act was subsequently amended in 1859 to permit a change in the institution's name to Trinity College and again in 1924 when Duke University was established.

Since 1852 the Trustees of Duke University and their predecessors have been legally empowered to act "not inconsistent with the laws of this State and of the United States." Thus, to this date all officers of Duke University and those to whom their powers may be formally delegated are bound by laws of North Carolina and those of the United States.

The University is not an island. Students, faculty, administrators, and Trustees alike are subject to state and federal laws. Acceptance of admission to any of the undergraduate schools or colleges of this University carries with it the assumption of a sense of responsibility for the welfare of the community. Also assumed are obligations on the part of each individual to respect the rights of others, to protect the University as a forum for the free expression of ideas, and to obey the laws of the state and nation.

Acts in violation of North Carolina and United States law are necessarily in violation of the Undergraduate Judicial Code. Such acts when committed on University premises are within the cognizance of the Undergraduate Judicial Board unless otherwise expected. When committed off the University premises they may fall within the board's jurisdiction if constituting a direct or indirect threat to the University community whether or not the offense results in action by a regular civil or criminal court.

Proceedings under the Judicial Code of the Undergraduate Community before, during, or after any which may occur in the regular state or federal courts do not subject a student to "double jeopardy" because such jeopardy arises only in criminal law proceedings. Governments alone, not the University, enforce the criminal law. Action by the board or other University agencies enforce the terms under which a student has accepted admission to Duke University and all sanctions imposed relate to a student's status at the University.

The Judicial Code of the Undergraduate Community. Although the laws of North Carolina and the United States are incorporated in the Judicial Code, enumerated below and included in the following section on University regulations and policies are common infractions lying within the jurisdiction of the Undergraduate and Residential Judicial Boards. Conduct in violation of the code is punishable by sanctions contained in Appendix C, Art. IV (K) and Appendix D, Art. V of this bulletin.

I. Academic Dishonesty

- A. Plagiarism: Expropriation of words, phrases, or ideas of another without attribution for the benefit of one who engages in the act of expropriation. (See "Use and Acknowledgement of Sources" in this bulletin.)
- B. Cheating:
 - 1. Obtaining access, without the instructor's permission, to an examination question or questions prior to the instructor's distribution of the examination.
 - 2. Copying or attempting to copy during an examination from another's work in progress or completed, handwritten, typed, or published without consent of the instructor.
 - 3. Without the instructor's permission, collaborating with another, knowingly assisting another or knowingly receiving the assistance of another in writing an examination or in satisfying any other course requirement(s).
 - 4. Committing fraud on a record, report, paper, examination, or other course requirement to be submitted to or in the possession of an instructor.
 - 5. Submission of multiple copies of the same or nearly similar papers without prior approval of the several instructors involved.
- C. Academic Contempt: In the satisfaction of any course requirement, failure to adhere to an instructor's specific directions with respect to the terms of academic integrity or academic honesty for that course requirement.

II. Assault and/or Battery

- A. Battery: Any use of physical force against a person without his or her consent.
- B. Assault: Any threat of the immediate use of any degree of unauthorized physical force or an attempt to use such force which threatens or actual attempt gives rise to a reasonable apprehension of force against the person threatened as perceived by that person. (See also "University Regulations and Policies: Hazing" in this bulletin.)

III. Taking, Converting, and Selling

- A. Theft: Any wrongful physical taking and carrying away of the personal property of another without the rightful owner's consent with an intention to deprive the owner of its use.
- B. Larceny: Any wrongful physical taking and carrying away of the personal property of another without the rightful owner's consent and with an intention to convert it to the use of the taker and into the taker's own property or to convert it to the use of and ownership of a third party.
- C. Embezzlement: Fraudulent conversion of another's personal property by one to whom the owner trusted it.
- D. Fencing: Knowingly receiving or concealing stolen property.

- IV. Property Damage: Any damage to real or personal property owned by others including that owned by Duke University, especially fire equipment, as well as that owned by members of the University community and by visitors to the University. (See "University Regulations and Policies: Fire Equipment" in this bulletin and "Care of Dormitory Rooms and Adjacent Campus Areas.")

V. Breaking and/or Entry

- A. Breaking: Any bodily action or attempt by means of such bodily action intended to create an opening for access to real or personal property without consent of the owner of such property.
- B. Entry: Any physical bodily presence within real or personal property without consent of the owner. Such illegal entry includes trespass on unauthorized areas. (See "University Regulations and Policies: Roof and Ledge Areas, Unauthorized Access.")

VI. Disorderly Conduct

- A. Any action, committed without justification or excuse, that unreasonably disrupts the normal public use of public areas, or that substantially disturbs the peace and order of the University community. (See "University Regulations and Policies: Alcoholic Beverages" and "Noise.")
- B. Any grossly unreasonable and reckless conduct in the handling of things or substances ordinarily regarded as inherently dangerous or capable of becoming dangerous to other persons or to their real or personal property.

VII. Fraud

- A. Any intentional misrepresentation of fact in an attempt to induce another to surrender a right or property or to authorize the conferring of a benefit in reliance upon the misrepresentation.
- B. Forgery or alteration of documents, including course examinations, papers, or other required exercises, in an attempt to obtain a right or benefit or property.
- C. Obtaining a right or benefit or property under false pretenses.
- D. Unauthorized misuse of otherwise valid documents.

VIII. Bribery: Corruption of another for personal gain.

- IX.
 - A. Preparation: Devising or arranging means or measures necessary for commission of a prohibited act.
 - B. Attempt: Attempting any unlawful act specified in this Code by undertaking the intended action.

X. Contempt

- A. Failure to comply with direction, orders, or commands of any University judicial or police authority, or any academic or administrative official of the University acting in an official capacity. (See "University Regulations and Policies: Library Control Desk Inspections" in this bulletin.)
- B. Knowingly furnishing false information to any such authority or official of the University acting in an official capacity.

XI. Illegal Possession

- A. Any transporting to or storing on the campus or possession of firearms, weapons, explosives, or fireworks. (See "University Regulations and Policies: Fireworks, Other Explosives and Weapons" in this bulletin.)
- B. Any violations of the University's Alcohol or Drug Policy.

- XII. Accessory to Commission of a Prohibited Act: Aiding or abetting or otherwise acting as an accomplice to commission of any prohibited act.

University Regulations & Policies

Students should be familiar with the Judicial Code of the undergraduate community and with the following regulations and policies of the University. Violations are matters which are subject to adjudication before the Undergraduate Judicial Board.

DUKE UNIVERSITY REGULATIONS REGARDING ALCOHOLIC BEVERAGES AND EVENT REGISTRATION

INTRODUCTION

The University has adopted the following regulations to govern the use of alcoholic beverages by students and the registration of events on its campus. This policy applies to two types of events: (1) those at which alcoholic beverages are present; and (2) those required to be registered, regardless of whether alcoholic beverages are present.

The event registration provisions apply only to registering an event with the Office of Student Life to insure that the sponsoring organization and/or individual(s) is (are) informed of all regulations pertaining to the use of alcohol and to the noise policy. This policy *does not* satisfy the requirements of reserving space in nonresidential facilities; sponsors must on their own initiative secure the space and satisfy any requirements.

This policy is premised upon the belief that Duke students are mature individuals capable of and willing to follow and enforce the provisions of this policy themselves, with assistance from the Dean for Student Life and Public Safety as set forth below. Failure to accept responsibility which comes from permitting alcohol on campus will result in the University taking appropriate action.

The effective date of this policy is August 15, 1986. The Vice-President for Student Affairs has charged the Dean for Student Life with the responsibility for implementing, interpreting and, in cases deemed deserving by the Dean, making exceptions to these regulations. These regulations may be amended from time to time at the discretion of the Vice-President for Student Affairs.

NORTH CAROLINA LAW (North Carolina General Statute Section 18B-101 *et seq.* The following is a summary of Article 3 of the statute.)

Sale to or Purchase by Underage Persons

1. Sale

- a. It is against the law to sell or give beer or wine to anyone less than 21 years old.
- b. It is against the law to sell or give liquor or mixed beverages to anyone less than 21 years old.

2. Purchase or Possession

- a. It is against the law for a person less than 21 years old to purchase or possess beer or wine.
- b. It is against the law for a person less than 21 years old to purchase or possess liquor or mixed beverages.

3. Aider and Abettor

- a. Any person less than 21 years old who aids or abets another in violation of the above regulations shall be guilty of a misdemeanor, punishable by a fine up to \$500 or imprisonment for up to six months, or both.
- b. Any person over 21 years old who aids and abets another in violation of the above regulations shall be guilty of a misdemeanor, punishable by a fine up to \$2000 or imprisonment for up to two years, or both.

4. It is unlawful to use a fraudulent ID or to permit the use of one's ID by another to purchase or possess alcoholic beverages in violation of the above sections.

5. It is unlawful to give alcoholic beverages to an intoxicated person.

6. Conviction Report sent to Division of Motor Vehicles. Persons convicted of violating the above sections may automatically have their drivers license revoked for a period of one year.

In addition to the North Carolina law regarding the use of alcoholic beverages, Duke University has adopted the following regulations regarding alcoholic beverages and event registration.

DEFINITIONS

1. "Alcohol Beverages"—any beverage containing at least one-half of one percent (0.5%) alcohol by volume, including beer, wine, liquor and mixed beverages.
2. "Common Container"—any keg, large bottle, punch bowl, trash can or other device used for storing or mixing a quantity of beverage greater than that which can reasonably be consumed by one person (and his/her guest).
3. "Event"—a party, concert, or other group social gathering held on the University campus attended by students (e.g., a wine and cheese reception in an academic classroom).
4. "Legal Age to Drink"—21 years of age and older. [Note: While the State of N.C. will not raise the legal age to drink beer and unfortified (table) wine until September 1, 1986, University policy will consider the legal age to drink all alcoholic beverages to be 21 as of August 15, 1986, the effective date of this policy.]
5. "Registered Event"—any event held on the University campus will be classified as either registered or unregistered. Events described in Section B. 1. of this policy must be registered and must be held in accordance with the provisions of that section of the Policy.
6. "Sale"—any transfer, trade, exchange or barter, in any manner or by any means, for consideration.
7. "Unregistered event"—any event held on the University campus which is not required to be registered under Section B. 1. of this policy is an unregistered event. An unregistered event must be held in accordance with the provisions of Section C of this policy.
8. "Use of Alcoholic Beverages"—possession, consumption, distribution, purchase, sale or transfer of alcoholic beverages.

A. GENERAL PROVISIONS APPLICABLE TO ALL EVENTS.

1. The use of alcoholic beverage is permitted only by those of legal age to drink and in accordance with N.C. law governing alcoholic beverages.
2. The sale of alcoholic beverages by students is prohibited. Alcoholic beverages may be sold by the University to students of legal age to drink at licensed premises.
3. The use of alcoholic beverages as a prize in a contest, drawing, raffle, lottery, etc. is prohibited.
4. All residential and social groups are responsible for designating a member to participate in an Alcohol Awareness Session at the beginning of each academic year. This representative must recognize that he/she is responsible for disseminating current information concerning the use of alcohol and the existing State and University regulations concerning its use to members of his/her organization.
5. Sponsoring groups and living groups remain responsible for the general tone of their social event, and by majority vote they may adopt regulations more limiting than the laws of the State and the provisions of this policy.
6. Alleged violations of this policy by groups and/or individuals shall be subject to adjudication by the judicial board(s).

B. PROVISIONS APPLICABLE TO REGISTERED EVENTS.

1. Registration

- a. An event sponsored by an undergraduate student group must be registered if any of the following occur:

- (1) scheduling of a nonresidential facility: e.g., Von Canon Hall, Card Gym, quads, etc.;
- (2) participants include individuals other than dues paying members of the sponsoring group and one guest per attending member;

- (3) sound amplification equipment is placed or directed outside (stereo speakers, live bands, etc.) in accordance with University policy; and/or
 - (4) attendees at event total 200 or more.
- b. An event sponsored by any other entity must be registered (See B.2.) if any of the following occur:
 - (1) scheduling of a facility other than the facility of the sponsor (which may be a facility member, graduate or professional student group, academic department, etc.) with permission from the dean or department head in charge of the facility;
 - (2) alcoholic beverages are present and participants include students other than members of the sponsoring group or department and one guest per attending member; and/or
 - (3) sound amplification equipment is placed or directed outside (stereo speakers, live bands, etc.) in accordance with University noise policy.
- 2. The required registration forms may be obtained in the Office of the Dean for Student Life, 109 Flowers, and must be completed and returned for approval to the office 72 hours prior to the event. Call 684-6488 for more information.
- 3. Alcohol stipulations for registered events.
 - a. The University prohibits the distribution of *any* alcoholic beverages at registered functions held in or adjacent to residence halls.
 - b. The University prohibits the distribution of alcoholic beverages in non-residential facilities with the following exceptions:
 - (1) The Old Trinity Room, Von Canon Hall, Central Campus Multipurpose Room, the Mary Lou Williams Center for Black Culture, and any facility approved by the Dean for Student Life. Alcoholic beverages may be served at these locations, to those of legal age to drink, only during events limited to no more than one guest per attending member. Prior approval to serve alcoholic beverages, including, if desired, the use of common containers, must be obtained from the Offices of the Dean for Student Life and the Assistant Business Manager for Business Auxiliaries. If approval is obtained and alcoholic beverages are served, a nonalcoholic beverage other than water must also be served in the same manner. The quantity of the nonalcoholic beverage must be sufficient to meet the demand for it. Individuals may not bring their own alcoholic beverages to these locations.
 - (2) In addition, the Dean for Student Life has discretion to approve the serving of alcoholic beverages, to those of legal age to drink, at certain events held in other nonresidential locations (e.g., senior class picnic) on a case by case basis. Before giving this approval, the Dean will take into consideration whether attendees of the event are of legal age to drink, whether access to the event and other functions can be effectively monitored, and whether satisfactory safeguards are in place to comply with North Carolina law governing alcoholic beverages.
 - c. Individuals of legal age may bring their own alcoholic or nonalcoholic beverages to registered events held in the residence halls, on the quad, in Card Gym, or in the Intramural Building. Under these circumstances, the individual will be responsible if he or she furnishes alcoholic beverages to a person not of legal age to drink. Further, individuals may not bring more

alcoholic beverage than he/she and one guest might reasonably consume over the course of the event.

4. Monitoring of registered events.

- a. The Dean for Student Life will determine if the sponsoring group will be required to hire Public Safety to perform the monitoring functions *set forth below* for events held in nonresidential buildings. These registered parties are limited to four hours and Public Safety will be required until the facility is cleared of all participants. When Public Safety is not required, the sponsoring group shall be responsible for performing the monitoring function by designating student monitors.
- b. The necessary monitoring functions include:
 - (1) monitor the size of the crowd,
 - (2) prevent outsiders from attending and screen for uninvited guests,
 - (3) maintain order, prevent damage, and identify persons responsible if damage occurs,
 - (4) stop music at the designated closing time, and
 - (5) facilitate the orderly withdrawal of event participants.

C. PROVISIONS APPLICABLE TO UNREGISTERED EVENTS

1. Unregistered events will be governed by the following alcohol stipulations:

- a. All unregistered events sponsored by an undergraduate student group at which alcohol is present must be held in the residence halls, unless prior approval is obtained from the Dean for Student Life for another location.
- b. All unregistered events sponsored by any other entity must be held in or adjacent to the facility of the sponsor (which may be a faculty member, graduate student group, academic department, etc.) with permission from the dean or department head in charge of the facility, unless prior approval is obtained from the Dean for Student Life for another location.
- c. At the unregistered events alcohol may be distributed (i.e., served) to members of the sponsoring group and one guest per attending member of legal age to drink.
- d. If alcoholic beverages are served, a nonalcoholic beverage other than water must also be served in the same manner. The quantity of the nonalcoholic beverage must be sufficient to meet the demand for it.
- e. If alcoholic beverages are present, the sponsor(s) and/or living group will be responsible if alcoholic beverages are served to a person(s) not of legal age to drink or if alcoholic beverages are served in excessive amounts to any person. If common containers for alcoholic beverages (e.g., beer kegs) are used at the event, the sponsor(s), living group, and/or the purchaser of the container is/are responsible if persons not of legal age to drink are served or serve themselves and is/are responsible if excessive amounts are served to or consumed by any person. The above responsibilities can not be avoided by the sponsor(s), living group, and/or the purchaser by leaving a common container unattended.
- f. Individuals may bring their own alcoholic or nonalcoholic beverage to unregistered events. Under these circumstances, the individual will be responsible if he or she furnishes alcoholic beverages to a person not of legal age to drink. Further, individuals may not bring more alcoholic beverages than he/she and one guest might reasonably consume over the course of the event.

2. Monitoring of unregistered events.

- a. The sponsor(s) or living group shall be responsible for performing the monitoring functions set forth below for unregistered events by designating student monitors.

b. The necessary monitoring functions include:

- (1) monitor the size of the crowd,
- (2) prevent outsiders from attending and screen for uninvited guests,
- (3) maintain order, prevent damage, and identify persons responsible if damage occurs, and
- (4) ascertain that persons not of legal age to drink are not served and do not consume alcoholic beverages.

PARTY PROMOTION

By choosing to serve beverages containing alcohol as part of a social function, you and your group or organization assumes certain responsibilities beyond direct University regulation.

Test cases involving common law precedents and the dispensation of alcohol beverages are changing the definition of who is liable for a drinker's actions to include the general category of "social hosts." A social host may be a fraternity, a residence hall organization, a private citizen, or any combination of the preceding.

For example, serving alcohol to a minor who subsequently breaks his leg could render an individual or group liable for the minor's medical bills. Serving an individual who is "already" or "obviously" drunk and who subsequently has an automobile accident could render an individual or group liable for the injury or death of third party victims of the accident, or any property damage resulting from the accidents.

In general, CREATING OR PROMOTING ANY SET OF CIRCUMSTANCES WHICH ENCOURAGE ANY OF YOUR GUESTS TO CONSUME ALCOHOL TO THE POINT OF INTOXICATION CAN HAVE FAR REACHING NEGATIVE CONSEQUENCES OF A MOST SEVERE NATURE.

Legal proof of negligence in the dispensation of alcohol usually involves the consideration of wide variety of factors, including the manner in which hosts promote social functions where alcohol is served.

In addition to the responsible monitoring of the social event itself, IT IS IMPERATIVE THAT YOU AND YOUR GROUP OR ORGANIZATION DO NOT PROMOTE YOUR EVENT IN SUCH A MANNER THAT A POTENTIAL GUEST MIGHT REASONABLY BELIEVE YOUR SOCIAL EVENT IS AN INVITATION TO BECOME INTOXICATED.

SPECIFICALLY: FLYERS, BANNERS, AND SIGNS WHICH ADVERTISE SOCIAL EVENTS WHERE ALCOHOL WILL BE SERVED MUST NOT OVERTLY OR COVERTLY STATE OR IMPLY AN INVITATION TO PARTICIPATE IN EXCESSIVE DRINKING.

CAMPUS BANNER POLICY

Requests for hanging banners on University buildings must be approved by the Physical Plant Office. If approved, a banner may be hung for a period of not more than three days. The banner must be removed by the sponsoring organization within 24 hours of the event that it advertises. In the event that there is no date for the banner, then a three-day maximum will be established for its display. If the group fails to remove the banner within the designated time, the University will remove it at a cost to the responsible organization or individuals. Where no sponsoring organization or individual may be identified, banners will be taken down immediately.

CONFERENCES AND CONVENTIONS

Invitations to individuals or to organizations outside the University to hold conferences or conventions on campus must be discussed with and approved by the Dean for Student Life well in advance of the extension of the invitation by the prospective host or host group at Duke. It is the established policy of the University not to use its dormi-

tory facilities for the housing of convention guests during the academic year. The University does, however, reserve the right to use dormitory rooms for special guests during announced vacations.

DISCRIMINATION, APPEAL PROCEDURE FOR STUDENTS EMPLOYMENT

Complaints from students of discrimination regarding hiring practices should be filed in writing with the Office of Placement Services, 214 Flowers Building. A staff representative of the Office of Placement Services shall notify the University Equal Opportunity Officer in writing of the complaint within ten (10) working days. The Equal Opportunity Officer will investigate the complaint, notify the Office of Student Affairs and the respective college or school of the student, and attempt to reconcile the parties. Should the complainant feel that the complaint of discrimination has not been remedied after receiving a written evaluation from the Equal Opportunity Officer, appeal may be made to the respective dean of the student's college or school.

DOGS ON CAMPUS

All dogs found running loose on campus or tied to an obstacle with the dog unattended by the owner will be removed from the campus to the Durham County Dog Pound by a county official. Upon claiming the dog the owner will be required to furnish identification. The Department of Public Safety will refer the names of such students to the appropriate dean; employees will be referred to their department head. Other persons who indicate an unwillingness to cooperate with Duke University regulations in this matter will be given trespass warnings.

DRUGS

Duke University prohibits its members to possess, use, or distribute illegal drugs, including opiates, barbiturates, amphetamines, marijuana, and hallucinogens, except for legally authorized possession and distribution of drugs of the classes specified. In addition, the presence and use of many of these drugs within the University community are contrary to the intellectual and educational purposes for which the University exists.

The University recognizes that ignorance or innocence concerning such drugs threatens the safety of members of its community. It therefore seeks to provide as much information as it can concerning the consequences of harmful drugs. The University recognizes also that the illicit use of drugs may reflect emotional problems and is prepared to assist its members involved in their use through medical and psychiatric counseling. Nevertheless, the University considers a violation of the drug prohibition a serious matter and reserves the right to take action appropriate to the circumstances of each case.

Action taken by the University in all cases of drug violation will be guided by a concern both for the emotional and physical welfare of the person involved and for the maintenance of a suitable educational environment for all members of the University. See Appendix F for rules governing drug violations.

FIRE EQUIPMENT

In an effort to provide adequate protection, fire extinguishers are located in all residence halls. Since the installation of this equipment, numerous fires have been quickly controlled, avoiding injury or loss of life. The potential impact of having fire extinguishers vandalized or stolen is clear; yet, each year individuals continue to disregard the safety and rights of others by destroying and tampering with this equipment.

Damage and/or theft of fire equipment is punishable under North Carolina General Statute 14-260 which carries a maximum penalty of six months imprisonment and/or \$500 fine. In addition, students who have allegedly misused or vandalized fire equipment may have their housing licenses revoked and/or be referred to the Undergraduate

Judicial Board. Judgments rendered by this board may result in the loss of housing privileges and/or other punishment.

It is University policy that dormitories be billed for theft and/or vandalism of fire extinguishers within the residence halls.

To further assure life safety, fire alarm systems are located in each residence hall at convenient locations to alert the occupants in case of fire. Turning in false alarms may result in unnecessary deployment of fire vehicles and the penalties for turning in false alarms or tampering with the alarm system are the same as those listed above. (See section on "Revocation of the Housing License," page 27.)

FIREWORKS, OTHER EXPLOSIVES, AND WEAPONS

The General Statutes of North Carolina strictly prohibit the possession of firearms, explosives, starter pistols, and weapons on any university campus. Students are not permitted to bring to the campus or store on the campus any weapon, including any gun, rifle, pistol, explosive, switch-blade, knife, or dagger. Students may not possess fireworks of any kind. If found to be in violation of this policy, students may have their housing licenses revoked and/or be referred to the Undergraduate Judicial Board. (See section on "Revocation of the Housing License," page 27.)

HAZING

Duke University considers hazing to be a serious infraction of University regulations. Hazing Policy: Any action taken or situation created, intentionally, whether on or off fraternity, sorority, or University premises, to include physical discomfort, embarrassment, harassment, or ridicule. Such activities and situations include but are not limited to paddling in any form; creation of excessive fatigue; physical and psychological shocks; road trips, or any other such activities carried on, in or outside the confines of the University; wearing publicly apparel which is conspicuous and not normally in good taste; engaging in public stunts and buffoonery, morally degrading or humiliating games and activities which are not consistent with fraternal law, ritual, or policy or the regulations and policies of Duke University. (Modified from: Statement on Hazing, Fraternity Executive Association). Students should also be aware that hazing is a misdemeanor under North Carolina state law and is punishable by up to a \$500 fine and/or six months imprisonment. The action of even one member of the group may constitute hazing by the fraternity or sorority. Any fraternity or sorority convicted of hazing may be warned, placed on probation, or the charter of the group suspended for a period of time or permanently. Individuals responsible for hazing are also liable for action by the Undergraduate Judicial Board.

IDENTIFICATION CARDS

Undergraduate students are issued identification cards (the Duke Card) which they should carry at all times. The cards are the means of identification for library privileges, student health services, athletic events, and other University functions or services open to them as University students. These cards also serve to purchase food on a selected meal plan or other food and nonfood items on the flexible spending account. Students will be expected to present their cards upon request to any University official or employee.

The cards are not transferable, and fraudulent use may result in loss of student privileges or suspension. A student should report the loss of this card immediately to the Office of the Registrar, 103 Allen Building. The cost of a new Duke Card is \$5.

LIBRARY MATERIALS SECURITY

Library materials are electronically protected from theft by automatic locking of the exit gates when items have not been properly charged. An alarm sounds simultaneously,

drawing attention to the situation and requiring the person to return to the circulation desk nearby to ascertain the problem.

Anyone who refuses to permit his or her books to be examined may be denied further use of the library. Student offenders will be reported to the appropriate dean of the University, who is authorized to refer such offenders to judicial boards or to take independent disciplinary action, including penalties, up to and including suspension, appropriate to the seriousness of the offence.

LIBRARY POLICY CONCERNING FOOD, DRINK, AND TOBACCO IN PUBLIC AREAS.

This policy is meant to decrease:

- a. Damage to books and furnishings
- b. Infestation of the building and the collection by vermin
- c. Deterioration of a pleasant, studious environment
- d. Cost of housekeeping

The policy applies in *public areas* of the library to all people, including University staff, faculty, students, and other persons working in or using the library. Public areas include the several study rooms, seminar rooms, all carrels, elevators, hallways, restrooms, stairwells, and all book stacks. Also, this policy applies to everyone when walking through public areas of the library.

1. No smoking or other tobacco use is allowed except in designated areas.
2. No food or drink is to be consumed except in designated areas.
3. Food, drink, and tobacco will be subject to confiscation by library security clerks if used in undesignated areas.
4. Any food and drink brought through the library for legitimate use must be concealed; open containers are subject to confiscation by library staff.

MEDICAL CENTER STUDENT TRAFFIC

Duke Hospital and clinics provide medical service and support to thousands of patients and their families. Student traffic brings congestion, noise, and additional building maintenance that are incompatible with patient care.

MONDAY THROUGH FRIDAY, 8 AM- 5 PM

Students are requested to walk around Duke Hospital South via Trent Drive and Flowers Drive on their way to and from Hanes House/Hanes Annex/Trent Hall/Pickens.

SATURDAY, SUNDAY, HOLIDAYS, after 5 PM

If the hospital must be used as a shortcut between the main campus and Hanes House/Hanes Annex/Trent Hall/Pickens, please do so quietly, orderly, and mindful of the patients, their families, and the nature of the environment. Use the Main Entrance (#1) and do not linger or congregate.

At all times, bicycles and sports equipment should not be brought into the hospital. As would be expected, shoes and shirts are required.

NOISE (DISORDERLY AND DESTRUCTIVE BEHAVIOR)

This policy has been developed after consultation with the Associated Students of Duke University, the Interfraternity Council, the Upperclass House Association, the Residential Judicial Board and the Residential Policy Committee. This policy is based on the belief that all persons residing in the community have a responsibility to respect the rights, health, security, and safety of other community members and that persons who repeatedly fail to respect others should no longer be afforded the privilege of residing in University housing.

Disorderly and/or destructive behavior by students is prohibited.

1. Any student accused of destroying personal or University property is liable for judicial action before the Residential Judicial Board or before the Undergraduate Judicial Board, as appropriate.
2. Quiet hours will be in effect throughout the campus except during the hours of 5:00 P.M. to 1:00 A.M. on Friday, from 1:00 P.M. to 1:00 A.M. on Saturday, and from 1:00 P.M. to 6:00 P.M. on Sunday. Quiet hours are in effect twenty-four hours a day at Central Campus Apartments.
 - a. Violations of quiet hours will be adjudicated by the Residential Judicial Board.
 - b. Even during the hours listed above, students are expected to continue to respect the rights of others.
 - c. During quiet hours, students who are disturbed should attempt to resolve the situation by contacting the other parties involved; or, if needed, seek the assistance of house officers or Resident Advisers. In some areas of campus, an internal system for dealing with disturbances has been established by house officers (including distributing lists of house officers and RAs to contact) which has worked quite well. All quadrangle areas are encouraged to implement such a procedure. During the hours listed above, the Public Safety Officers and student monitors will continue to respond to complaints and will notify those creating a disturbance that a complaint has been made. However, complaints made during the time periods noted above when quiet hours are not in effect will not be considered as violations of the policy unless extenuating circumstances are present such as noise interfering with classes which are in progress. If necessary, complaints may be registered by calling the Public Safety Office at 684-2444. Complainants should provide their name and location when calling the Public Safety Office. Such information will remain confidential. In cases going before the Residential Judicial Board, the Public Safety Incident Report will serve as the plaintiff. The chairman of the Residential Judicial Board (or designate) may contact the complainant to verify the incident and request additional information. If an anonymous complaint is made, the Residential Life Office will send a letter notifying the group or individuals that a complaint was made. If a group or individual receives two or more actionable noise complaints (where the complainants have been identified) and is found guilty by the Judicial Board, then all additional anonymous complaints will be made known to the board to assist in determining the sanction.
 - d. The Public Safety Officer or House Officer will forward to the Dean for Residential Life a report of all noise complaints. In those cases where students have cooperated when contacted by the Public Safety Office, a letter will be forwarded to the students concerned or to the President of the living group informing them of the complaint. The students will also be informed that any further complaints during the remainder of the academic year will be forwarded to the Residential Judicial Board for adjudication.
 - e. Should the Public Safety report indicate that the students had been warned and that the noises persisted and necessitated a return to the same student room or house in the same evening, then the report will be sent directly to the Residential Judicial Board for adjudication.
 - f. Residential and quad parties are permitted provided that such parties have been approved under procedures as implemented through the Office of the Dean for Student Life.
 - g. Under no circumstances during quiet hours may stereo speakers be placed or pointed outside. During nonquiet hours, an individual or living group may only place or point speakers outside for a function that has been approved by the Dean for Student Life.

It should be noted that residents are responsible for actions of their guests and that living groups as a whole may be held responsible for violations of this policy. The Residential Judicial Board when adjudicating a violation of the above policy will follow its established procedures and may impose the established sanctions including fines and or eviction from the residence halls.

PAINTING POLICY

There has been a long-standing tradition of allowing student organizations and individuals to paint the East Campus bridge. Students are reminded that this activity may not extend beyond the bridge to include the painting of roads, sidewalks, telephone poles, lamp posts, trees, or any other University or municipal areas. Any groups or individuals identified as being responsible for painting anything other than the bridge will be charged for clean up and may also be subject to judicial action.

PARTIES IN RESIDENTIAL AREAS OUTSIDE OF RESIDENCE HALLS AND "BEER BLASTS"

See "Alcoholic Beverages" in this bulletin.

PICKETS, PROTESTS, AND DEMONSTRATIONS

See Appendix E.

POLICY ON USE OF SEGREGATED FACILITIES

It is University practice not to discriminate in any way on the basis of race, creed or national origin. This statement covers official activities sponsored, financed and controlled by University personnel and campus organizations, whether these activities are held on or off campus. If they are held off campus, they must not utilize facilities where discrimination is practiced. Naturally the University will not attempt to dictate to individual students, faculty members, or private groups how they should conduct their personal affairs outside the University.

The above policy applies to all social functions sponsored by undergraduate residence hall campus organizations. The failure of student groups to comply with this policy may result in suspension of their social privileges. Repeated offenses by campus organizations could result in the revocation of their charters.

POLICY FOR REGISTERING "THEME" PARTIES

Any theme party held in the residence halls which involves the introduction of "foreign materials" (such as hay, bamboo, paper draping, etc.) as party decorations must be approved by the Safety Office of the Duke Public Safety Department. Because such materials may prove to be fire hazards, it will be necessary to have clearance from the Director of the Safety Office.

ROOF AND LEDGE AREAS, UNAUTHORIZED ACCESS

The only authorized persons permitted on the roof and ledges of University buildings are maintenance personnel and certain other University officials. Students found in these areas will be referred for judicial action and/or may be subject to the immediate revocation of their housing license.

POLICY CONCERNING FILMS AT DUKE

Films—open to the public—are shown every evening of the academic year August 24-May 12, graduation. During the two summer sessions there are at least two evenings per week of film showings.

Presenters

A. Film Committee Presenters

The two major film committees responsible for carefully chosen film series are (1) the D.U.U. Freewater Film Series, presenting 16mm film (in multiple showings of two or three presentations each evening) on Tuesday, Thursday, and Friday in the Film Theater, Bryan University Center, and on certain occasions children's films on Saturday morning; and (2) Quadrangle Pictures (Quad Flicks)—the oldest film program on campus presenting 35mm films on each Saturday and Sunday (two showings each evening) in Page Auditorium.

Participation in these two committees is open to students, faculty, and staff. For Freewater Films, contact the program adviser or the chairperson of the D.U. Union, 101 Bryan University Center, ext. 2911. For Quadrangle Pictures, contact the Director of Cultural Affairs, 109 Page, ext. 5578. Both groups solicit the opinions of the student body and faculty in the selections of films and are most happy to cooperate whenever possible in bringing films requested by departments and organizations.

During the two summer sessions, Freewater shows films on Sunday evenings and Quadrangle Pictures on Friday evenings, both in the Film Theater, Bryan University Center.

B. General Campus Presenters

Monday and Wednesday evenings may be utilized by departmental groups, residential units, fraternities and sororities, and by organizations chartered by ASDU to have public showings of 16mm films in the Film Theater. If admission is charged, the sponsoring group must use the Film Theater of the Bryan University Center, for which appropriate tax payment has been made to the city. The presenters should be aware of and should adhere to the following regulations:

1. All film presentations must be sponsored by the above organizations with funds from admission sales going to the respective organizations.
2. No film showing may be presented for an individual's self-aggrandizement.
3. Permission is withheld from film presenters for the showing of x-rated films until justification for their presentation is reviewed. Other films which, regardless of rating, are shown or have been found to encourage disruptive behavior may be restricted.
4. All film presenters must employ the services of a house manager and a projectionist, both provided by the Building Manager, Bryan University Center (office adjacent to the bank machines on the intermediate level, 684-2656). These employees will be present throughout the entire presentation. An estimate of cost will be available from the building manager.
5. All public announcements for the film showings (such as flyers, posters, calendar, and *Chronicle* announcements) must be made to display clearly the sponsoring group's official name. Advertising for all film presentations is restricted to the campus media.

Film Sources. A complete up-to-date collection of film catalogues may be found in the Office of Cultural Affairs, 109 Page Building, and the D.U. Union Office, 101 Bryan University Center. The reference room of Perkins Library also has extensive files of film catalogues and other relevant reference material. The Durham County Library (on north Roxboro Street) also has projectors (movie and slide) for rent. You must have a library card to rent these. Catalogues may also be ordered directly from film companies.

Locations for Film Showings. The auditorium on the Duke campus authorized for film showings for which an admission is charged is the Film Theater of the Bryan University Center. This hall is covered by the payment of a privilege license tax paid by Duke University to the city of Durham and to the state of North Carolina. To charge admis-

sion to films shown in other areas is in violation of state law and brings into question the legal position of the University.

Free Films. If no admission is charged and no donation is received, films may be publicly shown in any appropriate room on campus, but their scheduling must adhere to other rules applicable to general campus film presenters to prevent conflicts.

Possible Film Restrictions

A. X-Rated Films Policy—Permission is withheld from film presenters for the showing of x-rated films until justification for their presentation is made through appeal.

1. An appeal by the Freewater Film Society and by other organizations under the jurisdiction of the University Union will be reviewed by the board of the University Union whose decision will be communicated to the Vice-President for Student Affairs for final review.
2. An appeal by other chartered organizations will be reviewed by the Vice-President of Student Affairs directly. All reviews and subsequent decisions will take into account, among other considerations, the objectives to be served by exhibiting the film, its educational value, and the extent to which the request can be supported by a social or aesthetic justification. When, in response to an appeal, permission is granted to present an x-rated film, the following procedures will be required: the Vice-President for Student Affairs will (a) decide whether or not the film in question shall be listed in the Duke University weekly *Calendar*, (b) designate what kind of identification may be required of members of the Duke University community and/or their guests, (c) decide whether or not a representative of the Public Safety Office may be required for the purposes of assisting the sponsoring group, at the latter's expense. In addition, those attending must show proof of age that complies with North Carolina state law.

B. Other Film Restrictions—The decision to withhold the scheduling of films which, regardless of rating, are shown or have been found to encourage disruptive behavior may be made by:

1. The University Union board for films proposed by the Freewater Film Society and by other organizations under its jurisdiction.
2. The Film Board of the Office of Cultural Affairs for films proposed by chartered organizations. The decision by either of these boards to withhold the scheduling of a film may be appealed to the Vice-President for Student Affairs. When in response to an appeal, a favorable decision is reached, the same procedures listed in (a) through (c) will be required.

Film Scheduling Procedures and Regulations.

1. A general meeting of film presenters will be announced by the scheduling office prior to final examinations for film presentations to be scheduled during the next semester. At this meeting a lottery for the selection of dates will be held.
2. After the general meeting of film presenters films may be scheduled between the hours of 9:00 A.M. and 4:00 P.M. on weekdays in 109 Page Building.
3. Film presenters may schedule only one film per semester unless other dates are available. In this event an additional film may be scheduled after October 1 for the fall semester and January 31 for the spring semester. Both must be approved by the Director of the Office of Cultural Affairs or designate.
4. No film may be shown that is already scheduled for the academic year until following the originally scheduled showing. If groups decide to show a film that is already scheduled, they may not publicly announce in any way their choice of film presentation until the initial group has shown the film.

5. No public film showing (those announced to the general University community) may be scheduled at the same time on the same day as another film which has already been scheduled, unless no conflict is perceived by the group having completed their scheduling paperwork first.
6. The Manager of the Bryan University Center has reserved the Film Theater for use on Monday and Wednesday evenings for film presentations. The scheduling procedure starts at the Calendar Office, 109 Page Building. Pick up scheduling application (triplicate form in white, yellow, pink) and complete. Check the University *Calendar* for clear date to avoid conflicts. Select film and set starting times for multiple showings. All films must end by 12:30 A.M. to clear theater for closing before 1:00 A.M. Get signature of Director of Office of Cultural Affairs or designate to confirm date and film choice.
7. All chartered organizations' presenters should then proceed to the Office of Student Activities, located behind the Information Desk in the Bryan University Center. Pick up a review of bookkeeping procedures, get the account code of your organization and signature of the Director of the Office of Student Activities or designate. The Director of the Office of Student Activities or designate will not sign the scheduling application form until the following arrangements have been made: (a) the applicant organization's account has been reviewed to determine the ability of the organization to cover the film rental, film transportation, and both security and technical costs of the film presentation and (b) an IR form is prepared for the Building Manager, Bryan University Center, to cover costs for the employment of a house manager and a projectionist. Information which will be needed at this time includes: (1) rating of film (2) running time of film (3) cost of film and cost of film transportation.
8. Return to the Calendar Office no later than three weeks before the date of film presentation. Leave the original white copy at the Calendar Office, the yellow copy with the Building Manager of the Bryan University Center, and keep the pink copy for the film presentation as official authorization. (Note: scheduling will be forfeited if all procedures are not completed within the three-week deadline.)

NB: For showing films in an area other than the Film Theater for which no admission is charged and no donation is taken, arrangements must be made with the Technical Services Office, 03 Page Building, for use of projectors and a projectionist. For such showings, take an IR form to this office. All film showings must be cleared with the Office of Cultural Affairs to avoid conflicts.

9. Commons areas in residence halls and other such University facilities may not be used for the showing of "stag" films. In addition, such areas may not be used by individuals or groups for performances by strippers.

SAFETY

No institution can guarantee the safety of all students at all times. It is therefore recommended that students exercise caution at times and places known to be hazardous. It is recommended that students not study in a classroom alone or walk alone in unlighted portions of the campus or between campuses after dark. The Public Safety Office (684-2444) may be called to request escort service.

1. Do not walk, jog, or bike alone outside of well-populated areas.
2. Keep your room and apartment door locked *at all times* whether or not you are present.

3. After the closing hours of women's residence halls, all external doors should be kept locked or closed.
4. Immediately report to the Public Safety Office, 911, or 684-2444, any incident taking place that threatens safety or appears suspicious.

SOLICITATION POLICY

Commercial selling or soliciting in the residence halls is prohibited whether by residents or nonresidents.

The Bryan Center environs may be used for the purpose of sales, distribution, or events involving the use of sound amplification equipment. Any such activity must be sponsored by a recognized campus organization and requires the prior approval of the Office of Student Activities.

STUDENT RECORDS

In accordance with the Family Education Rights and Privacy Act of 1974, Duke University generally permits students to inspect their educational records and protects the information in such records from disclosure to third parties without the students' consent. The University's policy on the release of students' records is on file in the Office of the University Registrar.

Address and telephone information provided to the Office of the Registrar may be released without student consent unless written notification is provided to the office by the end of the second week of classes.

TRAFFIC REGULATIONS

Motor vehicles must be registered annually at the beginning of the fall semester or, if a vehicle is acquired later, within five days after bringing it to the or, if a vehicle is acquired later, campus. All registration takes place in the Traffic Office, 2010 Campus Drive, and at other places and times as announced. Students in the School of Medicine and other Medical Center programs, residents of Hanes House, Hanes Annex, and Trent Hall, will all register through the Medical Center Traffic Office at places as announced. There is an annual parking fee, determined by location and status. Students must present their student identification card.

Upon registration of a motor vehicle, students will receive a copy of the University motor vehicle regulations. Operation of a motor vehicle on the campus is contingent upon compliance with these regulations.

All vehicles parked illegally, including bicycles, motor bikes, motor scooters, and motorcycles parked within the residential hall buildings, may be subject to towing.

VENDING AND ELECTRONIC GAMES (PIN-BALL, FOOS-BALL, ETC.) EQUIPMENT

Only University-owned vending and electric game equipment is permitted in the residence halls. Living groups interested in renting this type of equipment should contact Duke University Vending Services, a service component of the Duke University Stores. Such equipment rented from sources outside the University is prohibited.

VIDEO CASSETTE RECORDERS

Students are advised that Federal copyright law restricts the use of video cassette recorders to private showings and prohibits their public performance.

POLICY ON NONDISCRIMINATION

Duke University does not discriminate on the basis of age, race, color, national and ethnic origin, sex, or handicap, in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. Inquiries concerning the University's responsibility may be directed to Dolores L. Burke, University Equal Opportunity

Academic Honesty



Use and Acknowledgement of Sources

THE IMPORTANCE OF ACADEMIC INTEGRITY

Independent learning and the acceptance of individual responsibility are values which are highly regarded among undergraduates at Duke University. It is recognized that personal integrity, and the achievement of genuine scholarship in a community of mutual respect, depend upon the commitments of students as well as faculty to these ideals.

Independent learning sometimes involves one in an investigation of novel data or ideas, and in the formulation of original hypotheses. Yet for most college students, independent learning means the patient search for information, the sifting of criticism which others have published, and the use of this material in the statement and defense of their own conceptions and judgements. From the reading of books, periodicals, and other printed materials, research papers and original compositions are written in partial fulfillment of course requirements. It is therefore of importance that all students understand what is expected of them in using and acknowledging such source materials.

Some entering students may have given little, if any, thought to the issue of academic honesty, for they may have been permitted to copy word for word encyclopedias and other reference works without the use of quotation marks. More perhaps have become accustomed to paraphrasing other peoples' ideas without giving credit to whom credit is due. Some students, who have recognized such common forms of plagiarism and avoided them may have fallen into habits of writing which are nonetheless dishonest. A chief contributing factor is a careless manner of notetaking, in which a student's own comments become hopelessly entangled with the words and phrases copied from sources. When notes of this kind are used as a basis for a report, one usually is either unable to identify clearly the ideas which are not his own, or else, since the sources are not open before him at the time of writing, he can easily suppose that no credit need be given. In this way essentially honest students can and do unwittingly undermine their own academic integrity, and that of the community of scholars to which they belong.

It is sometimes protested that educators are too scrupulous in this matter, that there are so many borderline cases as to make the maintenance of standards impracticable. Are not books written to be used by anyone who chooses to rely on them? Do not researchers publish their ideas for others to share? How is one able to distinguish clearly between privileged information and public or common knowledge? Yet thoughtful consideration

will lead one to see why honesty is the *sine qua non* of scholarship, the essential binding principle of any sound academic community and why scrupulosity in this matter is necessary.

A scholar's contributions are his ideas and insights; these are his actual achievements. While in college he receives recognition for his ideas and skills in the form of grades and credit toward graduation and, in some cases, scholarship awards. After graduation, he may be offered fellowships for graduate study or job opportunities on the basis of these accomplishments. Such things are posited on the faith that a scholar's work and achievements are his own, and that his record indicates accurately the extent to which he is able to organize in his own way that knowledge which is important to the work he is fitted to do. Unless the evaluation of each student's accomplishment is based on his real abilities, on work actually done and rewards gained, his college record becomes a fraudulent document, and an unfair advantage is gained over other students whose scholarship is honestly represented. Among the many factors essential to the good life of a quality college, commitment to the value of academic integrity is crucial. Students assume individual responsibility in this matter; their failure to do so, for whatever cause, is especially lamentable.

The following is published to provide basic information on the subject. First, there is reproduced a definition of plagiarism which, by furnishing examples, illustrates the improper use of source material. The appendix is a statement written by the chairman of the judicial board of the undergraduate colleges.

A DEFINITION OF PLAGIARISM

The academic counterpart of the bank embezzler and of the manufacturer who mislabels his product is the plagiarist, the student or scholar who leads his reader to believe that what he is reading is the original work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone's mind, there would be no need for the explanation that follows: merely the warning with which this definition concludes would be enough. But it is apparent that sometimes men of good will draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of "borrowing" and of the procedures for correct identification of materials other than those gained through independent research and reflection.

The spectrum is a wide one. At one end there is a word-for-word copying of another's writing without enclosing the copied passage in quotation marks and identifying it in a footnote, *both* of which are necessary. (This includes, of course, the copying of all or any part of another student's paper.) It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping in of a particularly apt term which one has come across in reading and which so admirably expresses one's opinion that one is tempted to make it personal property. Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit—but more the result, perhaps, of laziness than of bad intent—is the patching together of random jottings made in the course of reading, generally without careful identification of their sources, then woven into the text, the cement to hold the pieces together. Indicative of more effort and for that reason, somewhat closer to honesty, though still dishonest, is the paraphrase, an abbreviated (and often skillfully prepared) restatement of someone else's analysis or conclusion, without acknowledgement that another person's text has been the basis for the recapitulation.

The examples given below should make clear the dishonest and the proper use of source material. If instances occur which these examples do not seem to cover, conscience will in all likelihood be prepared to supply advice.

THE SOURCE

The importance of the Second Treatise of Government printed in this volume is such that without it we should miss some of the familiar features of our own government. It is safe to assert that the much criticized branch known as the Supreme Court obtained its being as the result of Locke's insistence upon the separation of powers, and that the combination of many powers in the hands of the executive under the New Deal has still to encounter opposition because it is contrary to the principles enunciated therein, the effect of which is not spent, though the relationship may not be consciously traced. Again we see the crystallizing force of Locke's writing. It renders explicit and adapts to the British politics of his day the trend and aim of writers from Languet and Bodin through Hooker and Grotius, to say nothing of the distant ancients, Aristotle and the Stoic school of natural law. It sums up magisterially the arguments used through the ages to attack authority vested in a single individual, but it does so from the particular point of view engendered by the Revolution of 1688 and is in harmony with the British scene and mental climate of the growing bourgeoisie of that age. Montesquieu and Rousseau, the framers of our own Declaration of Independence, and the statesmen (or should we say merchants and speculators?) who drew up the Constitution have re-echoed its claims for human liberty, for the separation of powers, for the sanctity of private property. In the hands of these it has been the quarry of liberal doctrines; and that it has served the Socialist theory of property based on labor is final proof of its breadth of view.

CHARLES L. SHERMAN,
"Introduction" to John Locke,
*Treatise of Civil Government and A
Letter Concerning Toleration.*

1. WORD-FOR-WORD PLAGIARIZING

It is not hard to see the importance of the Second Treatise of Government to our own democracy. Without it we should miss some of the most familiar features of our own government. It is safe to assert that the much criticized branch known as the Supreme Court obtained its being as a result of Locke's insistence upon the separation of powers; and that the combination of many powers in the hands of the executive under the New Deal has still to encounter opposition because it is contrary to the principles enunciated therein, the effect of which is not spent, though the relationship may not be consciously traced. The framers of our own Declaration of Independence and the statesmen who drew up the Constitution have re-echoed its claims for human liberty, for the separation of powers, for the sanctity of private property. All these are marks of the influence of Locke's *Second Treatise* on our own way of life.

In this example, after composing half of a first sentence, the writer copies exactly what is in the original text, leaving out the center section of the paragraph and omitting the names of Montesquieu and Rousseau where he takes up the text again. The last sentence is also the writer's own.

If the writer had enclosed all the copied text in quotations marks and had identified the source in a footnote, he would not have been liable to the charge of plagiarism; a reader might justifiably have felt, however, that the writer's personal contribution to the discussion was not very significant.

2. THE MOSAIC

The crystallizing force of Locke's writing may be seen in the effect his *Second Treatise of Government* had in shaping some of the familiar features of our own government. That much criticized branch known as the Supreme Court and the combination of many powers in the hands of the executive under the New Deal are modern examples. But even the foundations of our state—the Declaration of Independence and the Constitution—have re-echoed its claims for human liberty, for the separation of powers, for the sanctity of private property. True, the influence of others is also marked in our Constitution—from the trend and aim of writers like Languet and Bodin, Hooker and Grotius, to say nothing of Aristotle and the Stoic school of natural law; but the fundamental influence is Locke's *Treatise*, the very quarry of liberal doctrines.

Note how the following phrases have been lifted out of the original text and moved into new patterns:

crystallizing force of Locke's writing
some of the familiar features of our own government
much criticized branch known as the Supreme Court
combination of many powers in the hands of the executive under the New Deal
have re-echoed its claims for human liberty . . . property
from the trend and aim . . . Grotius
to say nothing of Aristotle and . . . natural law
quarry of liberal doctrines

As in the first example, there is really no way of legitimizing such a procedure. To put every stolen phrase within quotation marks would produce an almost unreadable, and quite worthless, text.

3. THE PARAPHRASE

Paraphrase: Many fundamental aspects of our own government are

Original: Many familiar features of our own government are apparent in the *Second Treatise of Government*. One can safely assert that the oft-censured Supreme Court really owes its existence to the Lockean demand that powers in government be kept separate; equally one can say that the allocation of varied and that the combination of many powers the New Deal has still to encounter opposition because it is contrary to the principles enunciated therein . . . Once more it is contrary to the principles enunciated herein . . . Again we see it is possible to note the way in which Locke's writing clarified the crystallizing force of Locke's writing, existing opinion.

The foregoing interlinear presentation shows clearly how the writer has simply traveled along with the original text, substituting approximately equivalent terms except where his understanding fails him, as it does with "crystallizing," or where the ambiguity of the original is too great a tax on his ingenuity for him to proceed, as it is with "to encounter opposition . . . consciously traced" in the original.

Such a procedure as the one shown in this example has its uses; for one thing, it is valuable for the student's own understanding of the passage; and it may be valuable for the reader as well. How, then, may it be properly used? The procedure is simple. The writer might begin the second sentence with: "As Sherman notes in the introduction to his edition of the *Treatise*, one can safely say . . ." and conclude the paraphrased passage with a footnote giving the additional identification necessary. Or he might indicate directly the exact nature of what he is doing, in this fashion: "To paraphrase Sherman's comment . . ." and conclude that also with a footnote indicator.

In point of fact, this source does not particularly lend itself to honest paraphrase, with the exception of that one sentence which the paraphraser above copied without change except for abridgment. The purpose of paraphrase should be to simplify or to throw a new and significant light on a text; it requires much skill if it is to be honestly used and should rarely be resorted to by the student except for the purpose, as was suggested above, of his personal enlightenment.

4. THE "APT" TERM

The *Second Treatise of Government* is a veritable quarry of liberal doctrines. In it the crystallizing force of Locke's writing is markedly apparent. The cause of human liberty, the principle of separation of powers, and the inviolability of private property—all three major dogmas of American constitutionalism—owe their presence in our Constitution in large part to the remarkable *Treatise* which first appeared around 1685 and was destined to spark within three years, a revolution in the land of its author's birth, and ninety years later, another revolution against that land.

Here the writer has not been able to resist the appropriation of two striking terms—"quarry of liberal doctrines" and "crystallizing force"; a perfectly proper use of the terms would have required only the addition of a phrase: The *Second Treatise of Government* is, to use Sherman's suggestive expression, a "quarry of liberal doctrines." In it the "crystallizing force"—the term again is Sherman's—of Locke's writing is markedly apparent . . .

Other phrases in the text above—"the cause of human liberty," "the principle of the separation of powers," "the inviolability of private property"—are clearly drawn directly

from the original source but are so much matters in the public domain, so to speak, that no one could reasonably object to their reuse in this fashion.

Since one of the principal aims of a college education is the development of intellectual honesty, it is obvious that plagiarism is a particularly serious offense, and the punishment for it is commensurately severe. What a penalized student suffers can never really be known by anyone but himself; what the student who plagiarizes and "gets away with it" suffers is less public and probably leaves a mark on him as well as on the institution of which he is a member.

STATEMENT BY THE CHAIRMAN OF THE UNDERGRADUATE JUDICIAL BOARD

Duke University, as a community of scholars, strongly relies upon the standard of academic integrity. Plagiarism and other forms of academic dishonesty represent a corruption of this integrity and, as such, cannot be tolerated within the community.

The Undergraduate Judicial Board actively affirms the requirement that every undergraduate student at Duke read and understand the "Statement on Academic Honesty." This statement provides a definitive explication of what is required, in terms of academic honesty, of each student in the community. It has been the sad experience of the board that many cases of academic dishonesty are the result of ignorance as to what exactly constitutes this dishonesty. We firmly urge that each student refer to the statement whenever there is any question about matters of academic honesty. This small investment in time almost certainly outweighs the possibility of badly damaging one's academic career through ignorance or carelessness.

Ignorance of what constitutes academic dishonesty is no excuse for actions which violate the integrity of the community. The board must view any offense of academic dishonesty with the utmost gravity and will determine sanctions commensurate with the severity of the violation. In a community which builds on the notion of academic integrity, the threat of academic dishonesty represents an intolerable risk.

Appendices



Appendix A

DUKE UNIVERSITY LICENSE TO OCCUPY RESIDENCE HALL SPACE

FULL NAME: _____
(last) (first) (middle) (present living group)

HOME ADDRESS: _____
(social security number)

ACADEMIC YEAR 1988-89 _____ or SPRING 1989 _____

DUKE UNIVERSITY HEREBY LICENSES THE UNDERSIGNED TO OCCUPY A RESIDENCE HALL SPACE FOR THE ACADEMIC YEAR INDICATED DURING THE PERIODS WHEN RESIDENCE HALLS ARE OFFICIALLY OPEN FOR OCCUPANCY BY LICENSED STUDENTS. THE OFFICIAL OPENING AND CLOSING DATES OF RESIDENCE HALLS AND RECESS PERIODS DURING THE YEAR WHEN RESIDENCE HALLS ARE NOT OPEN FOR OCCUPANCY ARE PUBLISHED BY THE DEPARTMENT OF HOUSING MANAGEMENT. THIS LICENSE AUTOMATICALLY TERMINATES IF THE STUDENT OFFICIALLY WITHDRAWS, GRADUATES, OR CEASES FOR ANY REASON TO BE A FULL-TIME STUDENT.

I have read the accompanying terms under which I may occupy residence hall space, and I understand that my continued occupancy is conditioned on my compliance with these terms and all applicable University regulations. If I violate these terms and regulations, the University may revoke this license and may refuse to license me for any occupancy period subsequent to the one provided in this license. I further understand that the terms of this agreement and University regulations are subject to reasonable changes and that, provided I have been notified of such changes, the University may revoke this license should I violate any term or regulation in effect during my occupancy under this license.

Nothing in this license shall be interpreted as relief from the responsibility to comply with federal, state, and local law, and violation of any applicable law may be reason for revocation of this license.

In consideration of this license, I agree to pay the University according to the schedule of payments for the type of room I occupy as approved by Duke University, a copy of which has been furnished. I understand that, in the event the University revokes this license because I have violated the terms of this agreement or University regulations, I must vacate the room I am occupying immediately and the University shall not refund any portion of the payment made for the semester in progress. In the event I officially

withdraw, graduate, or cease for any reason to be a full-time student, I agree to vacate the space I am occupying within forty-eight (48) hours. I understand that I will be charged for that semester's housing based on the number of days I have occupied a space and will receive a refund for any amount I have paid for housing beyond the time of my departure. The number of days I have occupied the space will be determined according to the date Housing Management inspects the room and confirms that my space has been vacated.

Date _____

Signature of Student _____

SPACE REQUESTED AND RESERVED

Requested by student _____

Room number _____

House _____

Reserved by University _____

Room number _____

House _____

ROOM DESCRIPTION

Type of Room:

☐ Single

☐ Double

☐ Triple

☐ Single as double*

☐ Double as triple*

☐ with bath

Residential Life

3/17/88

TERMS UNDER WHICH DUKE UNIVERSITY LICENSES OCCUPANCY OF RESIDENCE HALL SPACE

The purpose of these terms is to establish mutual understanding among students who reside in Duke University's residence halls and between these students and the University with regard to use of residential facilities. These terms are an integral part of the license and are enforceable as covenants and conditions of the license. Any violation of the terms could lead to revocation of this license and/or disciplinary action. Occupants are responsible for the actions of their guests.

These terms apply only during periods when residence halls are officially open for occupancy by licensed students. A student in the residence halls at any other time may be trespassed from the premises.

*Undergraduate students assigned to single rooms converted for double occupancy and double rooms for triple occupancy may be moved to other rooms or to normal single or double rooms to improve student living conditions and to ensure better use of facilities. The student will be financially responsible for the announced rate for a normal single or double room as applicable. Vacancies occurring in single rooms used as doubles or in double rooms used as triples will make that (those) remaining occupant(s) financially responsible for the announced rate for a single or double room as applicable for the remainder of the term of the license.

I. RESERVATION, ASSIGNMENT, AND ROOM CHANGE PROCEDURES

- A. The license will not be effective unless accompanied by a signed board contract for the same academic year.
- B. Reservations for preregistered upperclass students who have paid residential deposits and the fifty (\$50) prepayment of rent will be made in accordance with procedures announced by the Dean for Residential Life. Every effort will be made to assign students in accordance with their preferences; however, the Dean or designee reserves the right to make or change final room assignments if in his/her judgment such reassignments are necessary.
- C. Exchange or transfer of rooms by students may be made only by the following procedure: (1) approval of room change by the Dean for Residential Life or designee (2) official inspection of vacated room by the Department of Housing Management (3) change of keys in appropriate service office. In all of the above, the student(s) seeking the change is (are) responsible for making appointments and arrangements. Any unofficial room change may lead to revocation of this license and will not relieve the student(s) involved of their obligation to pay occupancy, damages, and other costs for their assigned room.
- D. Vacancies existing in rooms will be filled by the Dean for Residential Life or designee.
- E. Undergraduate students assigned to single rooms converted for double occupancy and double rooms converted for triple occupancy may be moved to normal single or double rooms to improve student living conditions and to ensure better use of facilities. The student will be financially responsible for the announced rate for a normal single or double room as applicable.
- F. Vacancies occurring in single rooms used as doubles or in double rooms used as triples will make that (those) remaining occupant(s) financially responsible for the announced rate for a single or double room as applicable for the remainder of the term of the license.

II. PROCEDURES, MAINTENANCE, STORAGE, AND DAMAGES

- A. Maintenance will be performed normally on a routine basis; however, corrective, emergency, and preventive maintenance will be assigned as necessary.
- B. The University retains the right to enter the premises without the resident being present to carry out maintenance tasks, to conduct inspections regarding availability of space, and in case of emergency or failure of equipment which is causing damage or hazard to property or persons. Entry into the room for other reasons will be made during reasonable hours with notice to the assigned occupants.
- C. The Department of Housing Management cleans each room prior to occupancy. Thereafter it is the responsibility of the resident(s) to clean the room. The room is expected to be left in a clean condition by the vacating resident(s). If a room requires excessive cleaning after occupancy, the cost will be charged to the resident(s). Housekeeping services will be provided on weekdays during the academic year (excluding holidays) in common areas only of the residence halls. The cost of extraordinary cleaning resulting from a living group's activities will be charged to the living group.
- D. The University is not liable for damage or loss of personal property. Since the University does not provide insurance, occupants are encouraged to provide their own personal property insurance.
- E. The University is not liable for the failure or interruption of utilities (including air-conditioning in those residential facilities in which air conditioning units have been installed) or for damages resulting from failure or interruption of utilities or equipment. Residents are not entitled to any compensation or abatement of rent.

- F. Use of nails, screws, tacks, or adhesives which damage walls, furniture, or fixtures is prohibited. Advice on nondamaging ways of hanging artwork and other items is available from Housing Management.
- G. Buildings, building equipment, and furniture repairs or replacements necessitated by damage beyond normal wear and tear will be billed to the appropriate student(s) or living group in accordance with official procedures published by Housing Management. At the end of each academic year, outstanding living group charges will be divided equally among the group's members and charged to their student ledgers.
- H. The assigned occupant(s) is (are) responsible for reporting to Housing Management defects or damages found in a room within five working days after occupancy. (Forms are provided for the initial inspection by the Department of Housing Management.) The resident(s) of a room will be charged for any damages or modifications found in the room after occupancy unless previously noted on the inspection form.
- I. Each bedroom is equipped with furniture by the Department of Housing Management. The resident(s) of a room will be charged for any furniture missing from that room. Personally owned furniture may be added to the room by a resident provided all residents of that room consent.
- J. Students are collectively responsible for care of public areas including furnishings and equipment. University owned commons furniture may not be removed from its intended location. Anyone doing so may be charged with theft under the judicial code. Commons furniture found in bedrooms may be removed by University personnel at the expense of the occupant(s).
- K. Each resident is required to obtain a room key at the time of his/her occupancy. A deposit for this key will be charged to the student's Bursar's account at the rate published by the Department of Housing Management, which deposit is refundable to the person who was issued the key, only if the key is returned to the appropriate service office within forty-eight (48) hours of vacating the assigned space.
- L. Resident students may place empty trunks, luggage, and specialized packing cartons (e.g., stereo boxes) in storage rooms during the effective period of this license at no charge. The University takes no responsibility for the items stored or their contents. Procedures for storage on a fee basis are available from the Department of Housing Management.
- M. Non-University property left in rooms after the license period terminates will be disposed of at the discretion of Housing Management.

III. TERMS AFFECTING RIGHTS, ORDER, HEALTH, AND SAFETY

The following terms are designed to protect the health and safety and to provide for the comfort and privacy of all students who are licensed to occupy residence hall space. In addition to the following specific terms, any conduct which reflects a serious disregard for the rights, health, security, and safety of other occupants of the residence halls will be regarded as a violation of the license.

- A. Students are entitled to privacy in their assigned rooms as set forth in the University Privacy Policy published in the *Bulletin of Information and Regulations*. Sanitary or safety inspections may be conducted by government officials without notice in accordance with the general statutes of North Carolina and city and county ordinances. When the residence halls are officially closed during Christmas recess, inspections of rooms will be made by University officials to ensure that no fire or other hazards exist. Hazardous items will be removed and the student(s) involved will be notified when the buildings are officially opened.

- B. Every occupant of residence halls equipped with a security system is required to obtain a card key. A deposit for this card key will be charged to the resident's Bursar's account at the rate published by the Department of Housing Management, which deposit is refundable if the card key is returned to the appropriate service office within 48 hours after vacating the assigned space. Propping open outside residence hall doors or in any way tampering with the security system of the residence hall is also prohibited.
- C. The unofficial use or possession of residence hall keys, including possession of master keys or keys other than those assigned to the student, is prohibited. Keys and card keys are not transferable; switching keys with other students is prohibited.
- D. Lost/stolen keys must be reported immediately to the appropriate service office and a replacement key must be obtained. An additional deposit will be charged to the student's Bursar's account. The deposit on the lost/stolen key will be forfeited and the bedroom door lock will be changed if the resident is unable to present the lost/stolen key to the service office within two weeks.
- E. Except in case of fire, fire fighting equipment and alarms shall not be tampered with and shall remain in place. Residents must comply with all fire drills and fire regulations.
- F. Personally owned air-conditioning equipment and heating is not permitted in residence hall areas. Compliance with any existing University energy conservation policy is required.
- G. Tampering with electrical wiring, including but not limited to, the installation of direct wired ceiling fans and dimmer switches is prohibited.
- H. Locks and plumbing are not to be tampered with or changed by occupants.
- I. Damage caused by electrical appliances which are not owned by Duke University is the responsibility of the resident(s).
- J. Waterbeds are prohibited.
- K. In accordance with North Carolina General Statute 14-269.2, no firearms, explosives, fireworks, highly inflammable materials, or any articles which may be used as offensive weapons may be in the residence halls or on the campus. This includes knives, slingshots, clubs, pellet guns, rifles, BB guns, and all firearms and items of like kind.
- L. Animals, including, but not limited to, birds and reptiles, are not allowed in or around the residence halls even for short periods. An extermination, at the resident's expense, will be done if an animal enters the residence halls. Fish are allowed provided they are kept in an aquarium no larger than twenty-five gallons, the container is cleaned regularly, and no illegal species are kept.
- M. No personal effects may be left in the hallways, stairwells, or common areas of the residence halls; any personal effects so found will be disposed of at the discretion of the Department of Housing Management.
- N. Selling or soliciting in the residence halls, by residents or outsiders, that is either commercial or unrelated to University objectives or activities is prohibited.
- O. A room may be occupied only by the student holding a license for that room. This license may not be transferred by the student to another person. Guests are permitted in student's rooms and common areas for reasonable periods of time subject to the consent of each resident of a room and the specified residence hall visitation policies for each residential unit.
- P. Motor vehicles may not be stored or maintained at any time in any residence hall area. Bicycles may be retained by the owner in his or her assigned bedroom space, but may not be stored in commons, baths, corridors, entrances, or other residence hall spaces. Motor vehicles and bicycles in unauthorized areas will be removed. Students will be required to pay removal fees in order to recover such vehicles or devices used to secure them.

- Q. Access to roofs and attic space is forbidden.
- R. Candles or other open flame devices in the residence halls are prohibited unless permission is obtained from Duke University Safety Office upon application in writing and upon presentation of proper justification.
- S. Platforms, partitions, or similar structures may not be erected anywhere in the residence halls by students or living groups without the written approval of the Director of Housing Management or designee. Lofts may be erected only if a loft permit is completed and returned to the appropriate service office.
- T. Cable television on the Duke Network is provided in the commons room of each living group. Connecting televisions in bedrooms to the commons room cable or otherwise tampering with the cable is prohibited.

IV. PAYMENTS, RETENTION OF PAYMENTS, AND TERMINATION OF LICENCE

- A. Students pay for their license on a semester basis. Payments are to be made to the Office of the Bursar in accordance with established terms of that office.
- B. A prepayment of fifty (\$50) dollars must be paid by the deadline date published by the Residential Life Office in the spring by every resident student desiring to reserve a space in University housing for the following academic year. This fee will be applied to rent for the fall semester. The rent prepayment is not refunded to students who cancel their housing reservation after the last day of spring semester classes, unless the student is involuntarily withdrawn from the University.
- C. A one hundred dollar (\$100) residential deposit must be paid by each freshman upon admission to the University. While living in University housing, it is understood and agreed that the residential deposit shall not be applied to fees. Upon permanently vacating University housing, Duke shall, within ninety (90) days, refund said deposit, less any outstanding fees incurred in accordance with the established University policy. Charges for damages in excess of the residential deposit shall be assessed to the student. The residential deposit will not be refunded, after residential space is reserved, to new students who fail to matriculate. Currently enrolled students will receive a refund of the residential deposit if written cancellation is received by Residential Life by July 1 for the fall semester and by December 1 for the spring semester.
- D. Undergraduate students who have been assigned a room who wish to cancel their assignment must notify the Office of Residential Life in writing. Students who cancel their assignments after the contract has begun will be entitled to a refund of the unused rent, the amount to be determined by the date of written notification to the Office of Residential Life or the date of vacating the residence halls, whichever is later. In any case a minimum of \$50 will be retained by the Department of Housing Management.

Prior to the implementation of proposed amendments to the terms set forth above, such proposed amendments shall be submitted to the Residential Policy Committee and ASDU for their consideration and comment.

Residential Life
Revised 3/17/88

DUKE UNIVERSITY LICENSE FOR UNDERGRADUATE STUDENTS TO OCCUPY SPACE IN CENTRAL CAMPUS FACILITIES

NAME: _____ SS#: _____

HOME ADDRESS: _____

ASSIGNED LOCATION: _____

PERIOD: from noon _____ to noon _____

Duke University hereby licenses the undersigned to occupy space in the above named location for the period indicated above subject to the rules, regulations, and other terms of this licensing agreement and all applicable University regulations. Due to the economics of operating these units, this license will not be revoked to permit students to move to other University housing facilities or to move off campus.

I have read the rules, regulations, and other terms of this agreement, a copy of which has been furnished, under which I may occupy space in University housing and I understand that my continued occupancy is conditioned on my compliance with these terms and all applicable University regulations. (Attention is especially directed to Part III of the rules, regulations, and other terms.) If I violate any of these rules, regulations, and other terms, the University may revoke this license and may refuse to license me for any occupancy period subsequent to the one provided in this license. I further understand that the rules, regulations, and other terms of this agreement and University regulations are subject to reasonable changes and that, provided I have been notified of such changes, the University may revoke this license should I violate any rules, regulations, or other terms in effect during my occupancy under this license.

Nothing in this license shall be interpreted as relief from the duty to comply with federal, state, and local law, and violation of any applicable law may be reason for revocation of this license.

In consideration of this license, I agree to pay the University according to the schedule of payments for the type of space I occupy as approved by Duke University, a copy of which has been furnished. I understand that, in the event the University revokes this license because I have violated any of the rules, regulations, or other terms of this agreement or University regulations, I must vacate the space I am occupying immediately and the University shall not refund any portion of the payment made for the semester in progress. In the event I officially withdraw, graduate, or cease for any reason to be a full-time student, I agree to vacate the space I am occupying within forty-eight (48) hours; I understand that I will be charged for housing based on the number of days I have occupied that space and will receive a refund for any amount I have paid for housing beyond the time of my departure.

(for Duke University)

(Signature of Student)

Date

Date

Residential Life
Revised 3/17/88

RULES, REGULATIONS, AND OTHER TERMS FORMING A PART OF THE LICENSE OF CENTRAL CAMPUS APARTMENTS

One purpose of these terms is to establish a mutual understanding among students and the University with regard to use of facilities in the Central Campus Apartments. These rules, regulations, and other terms are an integral part of this license and are enforceable as covenants and conditions of the license. For further information please refer to the Central Campus Handbook.

I. ELIGIBILITY

Units in the facilities are available for assignment to any full-time Duke University student who is working toward a degree. Students who withdraw from school or take a leave of absence must vacate the apartment within forty-eight (48) hours from date of such withdrawal or leave.

II. PAYMENTS:

- A. **Prepayment:** A fifty (\$50) prepayment fee must be paid by eligible students who wish to participate in sign-up for a subsequent academic year. This prepayment will be credited to the fees for the fall semester. The rent prepayment is not refunded to students who cancel their housing reservation after the last day of spring semester classes unless the student is involuntarily withdrawn from the University.
- B. **Residential Deposits.** Unless previously paid, a student who wishes to reserve a unit in Central Campus Apartments, must submit a residential deposit of one hundred dollars (\$100) together with an application to the Manager, Housing Administration. While living in University housing, it is understood and agreed that the residential deposit, shall not be applied to housing fees. Upon termination of this license and vacating University housing, Duke shall, within ninety (90) days, refund said deposit, less any outstanding fees incurred in accordance with the established University policy. Charges for damages in excess of the residential deposit shall be assessed to the student. The residential deposit will not be refunded after an assignment has been made to students who cancel their assignments, forfeit their assignments, or fail to occupy the residential space except in the following instances. A student who has paid a prepayment for a subsequent academic year will receive a refund of the residential deposit if written cancellation is received by Residential Life by July 1. A student residing in University housing for the fall semester will receive a refund for the spring semester is received and approved by Residential Life by December 1.
- C. **Key Deposit.** Each resident of a housing unit will receive one key to the unit and one mailbox key at the time of his/her occupancy. A deposit for each of these keys will be charged at the rate published by the Department of Housing Management, which deposit is refundable only if the key(s) is(are) returned within forty-eight (48) hours of the termination of this license.
- D. **Housing Fees.** Payments for housing are to be made to the Office of the Bursar before occupancy in accordance with established terms of that office. Payments are to be made on a semester basis.

III. RESERVATION, ASSIGNMENT, SPACE CHANGE, AND CANCELLATION PROCEDURES

- A. Applicants for spaces in Central Campus Apartments will be assigned in order of dates of receipt of applications and the required deposit. Undergraduate students who are presently living in University housing will be assigned in accordance with procedures published by the Office of Residential Life.

- B. The number of students to be assigned to various types of units is established by the Department of Housing Management.
- C. Every effort will be made to assign the student in accordance with his or her preference. Because this is not always possible, the Dean for Residential Life, or designee, retains the authority to make final space assignments.
- D. The exchange or transfer of apartments may be made only upon approval of the Dean for Residential Life or designee. It is the responsibility of a student vacating space or exchanging apartments to make the apartment ready for the new tenant. The space to be vacated will be inspected by a representative of Housing Management to relieve the vacating student of financial responsibility for damage occurring after the student vacates. Any unofficial apartment change may be reason for revocation of this license and will not relieve the student(s) involved of the obligations to pay occupancy, damage, and other cost for the assigned space.
- E. The Office of Residential Life makes no effort to assign individual bedroom space within each unit. That responsibility is left to the assigned occupants.
- F. Units shall not be occupied in whole or in part by any person other than those regularly assigned by the Dean for Residential Life, nor may occupants sublet assigned space. Guests are permitted for short periods only, provided all residents of that unit are in consent.
- G. The Dean for Residential Life reserves the right to change space assignments if in his/her judgment such change(s) are necessary.

IV. PROCEDURES, MAINTENANCE, STORAGE, AND DAMAGE

- A. Maintenance to buildings, fixtures, utilities, equipment, furniture, and furnishings will be performed on a routine basis; however, corrective emergency and preventive work will be performed as necessary.
- B. Prior to occupancy, the Department of Housing Management will clean each vacant unit and will correct deficiencies. An inspection form will be made available for each apartment. Each assigned student should note on the form the condition of the apartment and furnishings at the time of occupancy to prevent misunderstandings. Instructions on the form must be followed.
- C. Occupants shall maintain the demised premises, the furnishings and equipment therein in good condition and shall be responsible for all broken windows and door glass and other damage beyond normal wear and tear, including failure of plumbing or equipment caused by misuse. In such cases, occupants shall be assessed the cost of materials and labor as invoiced by the Department of Housing Management for repairs, replacements, or reassembly. The Department of Housing Management shall have routine maintenance performed and agrees to make such repairs as may be rendered necessary insofar as the cause thereof does not arise from the willful acts or negligence of the occupant(s). No alteration, addition, or painting may be conducted within the premises by the occupant(s).
- D. Locks and plumbing are not to be tampered with or changed by residents.
- E. The University retains the right to enter the premises without the tenant being present for the following reasons: (1) emergency or failure of equipment which is causing damage or hazard to property or persons, (2) to conduct inspections to determine availability of space, (3) for routine maintenance, (4) during the break between the fall and spring semesters to ensure that the furnace has been left on and that the thermostats have not been set below 50 degrees. Furnaces that have been turned off will be turned on and the thermostats will be set at 50 degrees by the Department of Housing Management. Entry into the apartment for other reasons will be made during reasonable hours with notice to the assigned occupant(s).

- F. Non-University property left in apartments after the license period terminates will be disposed of at the discretion of Housing Management.
- G. The unofficial use or possession of apartment keys, including possession of master keys or keys other than those assigned to the student, is prohibited.
- H. Lost/stolen keys must be reported immediately to the Central Campus Service Office and a replacement key must be obtained with payment of an additional deposit. The deposit on the lost/stolen key will be forfeited and the lock(s) to the apartment will be changed if the resident is unable to present the lost/stolen key to the Central Campus Service Office within two weeks.
- I. The University is not liable for damage or loss of personal property. Since the University does not provide insurance, occupants are encouraged to provide their own personal property insurance.
- J. The University is not liable for damage, failure, or interruption of utilities. Interruption or curtailment of such services will not entitle the resident to any compensation.
- K. University-owned furniture or equipment placed in the unit may not be removed from the unit.
- L. Pianos, washing machines, dryers, dishwashers, radio transmitters, and waterbeds are not authorized in these units. Antennae may not be installed in any unit. Cable television on the Duke network is provided in the Central Campus Apartments.
- M. Use of screws, hooks, decals, tacks, and adhesive on walls, furniture, or fixtures is prohibited. Small picture hanging nails provided by the Apartment Operations Office may be used; however, heavy items may not be hung.
- N. Washing of cars in the Central Campus area is prohibited.
- O. No dusting or shaking of mops, brooms, or other cleaning material from the windows, doors, and balconies is permitted.
- P. No fences may be put up around the apartments.
- Q. Outside clotheslines are prohibited.
- R. Access to roofs and attic space is prohibited.

V. TERMS AFFECTING RIGHTS, ORDER, HEALTH, AND SAFETY

The following terms are designed to protect the health and safety and to provide for the comfort and privacy of all students who are contracted to occupy units in Central Campus Apartments. In addition to the rules, regulations, and other terms, any conduct which reflects a serious disregard for the rights, health, security, and safety of other residents will be regarded as a violation of the license.

- A. Combustible materials shall not be stored on the premises.
- B. Sidewalks, stairways, and entryways must not be used for purposes other than ingress or egress. Bicycles must not be left in these areas or other locations where they may cause harm to persons or groundskeeping equipment. Motorcycles must be parked in parking lots.
- C. Nothing shall be hung from balconies, porches, gutters, or stairwells.
- D. In accordance with North Carolina General Statute 14-269.2, no firearms, explosives, highly flammable materials, or any articles which may be used as offensive weapons may be in the Central Campus facilities. This includes slingshots, clubs, pellet guns, rifles, BB guns, and all firearms and items of like kind.
- E. Tampering with electrical wiring, including but not limited to the installation of direct-wired ceiling fans and dimmer switches is prohibited.
- F. Delivery trucks, automobiles, motorcycles, scooters, and minibikes will not be permitted on lawns and walkways, patios, or stairwells. These vehicles must be parked in legal parking spaces.

- G. Animals, including but not limited to birds or reptiles shall not be taken into or kept in or about the units. An extermination, at the resident's expense, will be done if an animal enters the apartment. Fish are allowed provided they are kept in an aquarium no larger than twenty-five gallons; the container is cleaned regularly; and no illegal species are kept.
- H. Residents shall maintain the areas adjacent to their apartments in a neat and orderly condition. No refuse, loose paper, cans, bottles, etc. shall be permitted to accumulate around the dwelling units. Any packing cases, barrels, or boxes used in moving must be removed by the occupants who are moving. Bulk refuse containers are located throughout the complex.
- I. Campers, trailers, boats, or similar units may not be parked in the parking lots or other areas at the Central Campus Apartments.
- J. Burning candles or other flames are prohibited in University housing.
- K. Any infectious or contagious diseases occurring within the apartment should immediately be reported to the Office of Residential Life.
- L. Selling or soliciting on the premises of University housing by residents or outsiders, that is either commercial or unrelated to University objectives or activities is prohibited.
- M. The apartment must be kept in good order and in a sanitary condition.
- N. Laundry rooms will not be used for storage of personal effects, bicycles or the like. The University is not responsible for lost or stolen clothing from laundries.
- O. All users of the Central Campus pool must observe swimming pool regulations published by Housing Management. Any user uses the pool at his/her own risk.
- P. Boisterous conduct in violation of the University noise policy is prohibited. Occupants are responsible for the conduct of their guests, and for any violation of these rules and regulations by a guests shall constitute a violation of same by occupants.
- Q. Fire extinguishers are placed in each apartment for the safety of occupants and as a safeguard of the property. Tampering with this equipment or use for any purpose other than extinguishing fires is prohibited.

VI. ENERGY CONSERVATION

All residents must comply with energy conservation programs as established by Duke University for residential facilities.

Residential Life
Revised 3/17/88

Appendix B

1988/89 DUKE UNIVERSITY RESIDENTIAL FOOD SERVICES CONTRACT

1. Duke University policy requires that all undergraduate students residing on campus participate in the Dining Plan offered by University Food Services. The only exception to this policy is that Central Campus residents are excluded from this requirement.
2. For Purpose of this Contract, hereafter the contract participant shall be referred to as the contractor.
3. The contractor may select one of the Dining Plan options listed below (plans A-E). The contract shall be for one full academic year. The contract dollars purchased by the contractor shall be allocated on a semester to semester basis, with one half of this contract billed to your Bursar account prior to the beginning of each semester.
4. Dining contract dollars that are unused at the end of the first semester shall be carried forward to the second semester, but in no case shall second semester contract dollars be drawn against prior to the beginning of the second semester.
5. This contract shall be in effect for the period commencing the first day of Freshman Orientation in the Fall Semester and ending after dinner on the Monday, following graduation in the Spring Semester. Contract dollars remaining in the contractor's Dining Plan account at the end of the academic year shall be refunded based upon the schedule listed in 12-B and 12-C below.
6. The contractor may change the Dining Plan commitment to a different level for the second semester only during the period of Monday, September 26, 1988 through Friday, November 18, 1988. There will be a fifteen dollar (\$15) charge for any Dining Plan change.
7. Duke University's ID card, the Duke Card, shall be the medium by which you will access your Dining Plan contract dollars. This card must be presented to the cashier at the time of purchase, and shall be the only way of accessing your Dining Plan account.
8. The Dining Plan account is nontransferable, either in part or in whole. However, contractors may pay for a guest's transaction by way of their Dining Plan.
9. University Food Services reserves the right to determine the hours and days of operation for all facilities, the menu and price of same, and all other operational requirements relative to this contract.
10. The dining contract requires a twelve dollar (\$12) nonrefundable yearly fee plus one of the plans listed below.

A (\$1,220)	B (\$1,720)	C (\$1,952)	D (\$2,120)	E (\$2,332)
--------------------	--------------------	--------------------	--------------------	--------------------
11. Additional dollars may be added to any Dining Plan listed above in increments of \$50. All additional dollars purchased shall be at full value, with \$50 invested equaling \$50 worth of buying power.

12. REFUND POLICY

- A . Official Leave of Absence or Withdrawal during the semester as certified by the Registrar or appropriate Dean, or student moving off campus (including to Central Campus) shall be refunded at full value of the remaining dollars in their account, less a twenty-five (\$25) withdrawal fee.

B. Balance remaining at the end of the semester for a one semester contractor:

The first \$50 remaining

100% credited to Bursar's account

All dollars above the first \$50

50% credit to Bursar's account

C. Balance remaining at the end of the academic year, for full academic year contractor:

The first \$100 remaining

100% credited to Bursar's account

All dollars above the first \$100

50% credit to Bursar's account

13. Any food removed from the "All You Can Eat" dining areas must be purchased at the a la carte price.
14. Any misuse of this contract, in part or in whole, by the contractor shall be subject to the provisions of the Duke University Judicial Code.

Please indicate your choice of Dining Contract Plan by circling the appropriate letter:

<u>PLAN</u>	<u>TOTAL COST*</u>
A	\$1,232
B	\$1,732
C	\$1,964
D	\$2,132
E	\$2,344

*Total cost includes the \$12 annual fee

Please Print or Type the following information:

FULL NAME _____ SS # _____

Please circle the appropriate descriptors below:

ON CAMPUS OFF CAMPUS FRESHMAN SOPHOMORE JUNIOR

SENIOR GRAD OTHER _____
EXPLAIN

I have read the above contract and accept the terms and conditions as set forth herein.

SIGNATURE _____ DATE _____

Please retain the last copy of this contract for your records.

Appendix C

JUDICIAL SYSTEM OF DUKE UNIVERSITY

Article I: The Judicial System

1.010 The judicial system of the University shall consist of the University Judicial Board, a Judicial Board for each of the communities hereafter defined (see Article III), and a Judicial Board for each of the residential units in the University.

Article II: The University Judicial Board

2.010 Jurisdiction

- a. The jurisdiction of the University Judicial Board shall be limited to cases arising out of the Pickets and Protests Regulations and cases involving more than one of the communities as determined by the Vice-President for Student Affairs in consultation with the Chancellor and the Chairman of the University Judicial Board.
- b. The University Judicial Board shall have jurisdiction over members of the student body, members of the faculty, and administrative personnel of the University not subject to the *Personnel Policy Handbook*.

2.015 Filing of Charges; Responsibilities of Vice-President for Student Affairs

- a. The Office of the Vice-President for Student Affairs shall have responsibility for receiving complaints, conducting investigations, and preferring charges concerning offenses within the jurisdiction of the board. The University Judicial Board shall hear no case without a finding of probable cause made by the Vice-President for Student Affairs, whose signature to the charge or charges shall constitute sufficient evidence of such finding.
- b. To assist the Vice-President for Student Affairs in the investigation of complaints, the gathering of evidence, and the preparation of charges, investigative and judicial aides may be appointed by the Vice-President and shall serve at his/her pleasure and under his/her direction. The number and specific duties of such aides shall be determined by the Vice-President for Student Affairs, who shall be fully responsible for all duties performed by them in their capacity as aides.
- c. The Vice-President for Student Affairs shall subpoena witnesses as directed by the University Judicial Board.
- d. The Vice-President for Student Affairs may delegate all or any portion of his/her duties as regards these judicial procedures to an aide or aides whose appointment is approved by the Vice-Provost and Dean of Undergraduate Instruction. The Vice-President for Student Affairs shall be responsible for the discharge of all duties thus delegated.

2.020 Membership

The University Judicial Board shall consist of a Chairman appointed by the Chancellor, five faculty members (two of whom shall be from the Law School) appointed by the Executive Committee of the Academic Council, and two student members from each of the communities (except in the case of the undergraduate community where there should be four members) elected by each community's Judicial Board. The Chairman of the Board shall select five-person panels consisting of a Chairman and an equal number of students and faculty. Cases referred to the board shall be assigned to the panels in rotation, provided that a member of a panel may, at his/her request, be excused from sitting on a case by the Chairman of the Board, who may appoint a substitute from among the other mem-

bers of the board. Each panel shall be known as a "Hearing Committee of the University Judicial Board."

2.030 Terms of Members

Faculty members shall normally serve for two-year terms, but are eligible for reappointment. The terms should be staggered in order to provide continuity. Two of the initial appointees shall be appointed for one-year terms. Student members shall serve for one-year terms, although they may be eligible for re-election. The board has the right to remove any member of the board for cause by a vote of a two-thirds majority of all members. The vacancy shall be filled promptly according to the original procedure.

2.040 Conduct of the Hearing

- a. The hearing will be conducted in private unless the accused requests an open hearing. If any objection is raised to conducting an open hearing in any particular case, the Hearing Committee of the University Judicial Board will decide the issue by majority vote. If the decision is made not to hold an open hearing, the accused shall be informed in writing of the reasons for the decision.
- b. The University and the accused may be represented by an adviser of his/her choice.
- c. The board shall promulgate its own rules of procedure consistent with academic due process and all provisions of this document.
- d. The accused has the right to challenge on the grounds of prejudice any member of the Hearing Committee sitting on his/her case. If an accused makes such a challenge, the Hearing Committee shall deliberate in private to determine whether cause exists. By a majority vote of the members of the tribunal (excluding the member being challenged), a member shall be removed from the case and replaced by a member of the board designated by the Chairman of the Judicial Board. In addition, the accused may exercise a challenge directed at the entire panel, in which case the challenge shall be made to the Chairman of the University Judicial Board, who shall excuse the panel challenged and refer the accused's case to the next panel in rotation.

2.05 The Right of Appeal

- a. In cases heard by the University Judicial Board, there will be no appeal when the accused is acquitted.
- b. A student or administrator who is not a member of the faculty convicted by the University Judicial Board may appeal to the President, or in his/her absence, the Provost, in which case such appeal shall be solely on the record of the proceedings before the Hearing Committee. Argument or appeal shall be on written submission, but the President may, in addition, require oral argument.
- c. A member of the faculty convicted by the University Judicial Board may appeal to the Faculty Hearing Committee authorized under the provisions for Academic Freedom and Tenure of Duke University.

2.060 Status of the Accused

Charges must be prepared without delay following the alleged commission of the offense. Pending final verdict on charges against the accused (including appeal), his/her status shall not be changed, nor his/her right to be on campus to attend classes suspended, except that the Chancellor or Provost may impose an interim suspension upon any mem-

ber of the University community who demonstrates, by his/her conduct, that his/her continued presence on the campus constitutes an immediate threat to the physical well-being or property of the members of the University community or the orderly functioning of the University. The imposition of interim suspension requires that the suspended individual shall immediately observe any restriction placed upon him/her by the terms of the suspension. The suspended individual shall be entitled to a hearing within three (3) days before the Hearing Committee on the formal charges. If he/she requires additional time to prepare his/her case before the Hearing Committee, he/she shall be entitled to an informal review of the decision imposing interim suspension by a three-person committee chosen from the members of the University Judicial Board by its Chairman. Interim suspension is an extraordinary remedy which will be invoked only in extreme cases where the interest of the University and members of its community require immediate action before the Hearing Committee can adjudicate formal charges against the suspended individual. If interim suspension is imposed and the accused is later found innocent, the University shall seek restitution as provided by the Hearing Committee with respect to the student's academic responsibilities incurred during the period of suspension.

2.070 Civil and Criminal Courts

Members of the University community may be subject to civil or criminal proceedings in a local court. The Chancellor may initiate legal action seeking injunctive or other civil relief, or file criminal charges when it is necessary to protect the person or property of members of the University community, or the orderly functioning or property of the University. Such action may be in addition to the filing of formal charges before the University Judicial Board and/or interim suspension.

2.080 Sanctions

- a. A Hearing Committee of the University Judicial Board shall have the power to impose the following penalties upon students:
 1. Expulsion. Dismissal from the University with the recommendation that the person never be readmitted.
 2. Suspension. Dismissal from the University and from participation in all University activities for a specified period of time after which the subject may apply for readmission.
 3. Suspended Suspension. Penalty (2), suspended because of unusual mitigating circumstances. In a period of time specified, conviction before the University Judicial Board, or before one of the community Judicial Boards may result in suspension.
 4. Disciplinary Probation. Placing a student on a probationary status for a specified period of time, during which conviction of any regulation may result in more serious disciplinary action.
 5. Exclusion from participation in extracurricular activities. Without limiting the generality of that penalty, such restrictions might involve participation in any collegiate athletics, or any public participation or performance in the name of the University. However, a Hearing Committee may not exclude a person from performance of the duties of an elective office, but may make such a recommendation to the appropriate organization. This penalty may be imposed by itself or in addition to any of the other enumerated penalties.
 6. Censure. Written reprimand for violation of the specified regulation, including the possibility of more severe disciplinary sanction in the event

of conviction for the violation of the same or one of equal seriousness within the period of time stated by the reprimand.

7. Admonition. By an oral statement to the offender that he/she has violated the University rules or has been in contempt of the board.
 8. Restitution. Payment for all, or a portion of property damage caused during the commission of an offense. This penalty may be imposed by itself, or in addition to any of the other penalties.
 9. Fines. Payment of reasonable sums to be determined by a Hearing Committee. This penalty may be imposed by itself, or in addition to any of the other penalties.
 10. Exclusion from social activities where the nature of the violation so indicates including, but not limited to, curfews or other revocation of upperclass privileges.
- b. A Hearing Committee of the University Judicial Board shall have the power to impose the following penalties upon faculty members and administrative personnel not subject to the provisions of the *Personnel Policy Handbook*.
1. Dismissal. Dismissal or termination of appointment.
 2. Censure.
 3. Admonition.
 4. Restitution.
 5. Fines.

2.085 Other Powers

The Hearing Committee may recommend to the University that it seek restitution with respect to the accused's University responsibilities incurred during a period of suspension or during the period when a hearing has been conducted or shall make such other nonpunitive recommendations with respect to the accused as it shall deem appropriate.

2.090 Records

The board shall promptly arrange a policy of keeping its own records, subject to the University policy on confidentiality.

2.095 Excusal of Members of the University Community from University Obligations

Any member of the University community whose presence is required at a hearing shall be excused from the performance of any University responsibilities which would normally be performed at the time when his/her presence is required before the Hearing Committee.

2.096 Revocation of Probation or Suspended Suspension

In the event that a student has been placed on suspended suspension or disciplinary probation by the University Judicial Board and subsequently is convicted of a violation of a regulation by any other University tribunal, the suspension of his/her suspension or the revocation of his/her probation will not automatically occur. In such a case the student shall be entitled to a hearing being limited to the issue of whether his/her probation should be revoked or whether he/she should be suspended as the result of the original conviction and the conduct which gave rise to the second conviction.

Article III: Community Judicial Boards

3.010 Community Judicial Boards

There shall be an undergraduate community consisting of the undergraduates in Trinity College of Arts and Sciences and the School of Engineering; a Divinity School community consisting of all students in the School of Divinity; a Law School community consisting of all students in the School of Law; a Medical School community consisting of all students in the School of Medicine; an Allied Health community consisting of all degree and certificate (i.e., paramedical, nondegree) students in the School of Allied Health; a Forestry and Environmental Studies School community consisting of all students in the School of Forestry and Environmental Studies; and a Graduate School community consisting of all students in the Graduate School. Except as hereafter provided for the undergraduate community, each community shall have such judicial system as its governing body may provide.

Article IV: The Undergraduate Community

4.010 The Undergraduate Judicial Board

A (1) *Board Established.*

There is established an Undergraduate Judicial Board, hereinafter denoted as the board.

*** A (2) *Membership.***

The board shall have thirty-five (35) members. Fifteen (15) will be from among the undergraduates, twelve (12) will be from among the faculty (Trinity College and the School of Engineering), and eight (8) will be from among the deans in the undergraduate school and college.

A (3) *Selection of Undergraduate Members.*

Student members of the board will be chosen from among interested rising juniors and seniors as follows:

- a.* Interested candidates will apply for positions by completing written forms devised by the board.
- b.* The candidates will subsequently take an objective-type written questionnaire on the several aspects of the undergraduate judicial system.
- c.* Those obtaining a passing score, as defined by the board, are deemed eligible for interviews.
- d.* Interviews will be conducted by senior student members of the board and one representative of the Undergraduate Student Government appointed by the Chief Executive Officer of that government.
- e.* From among those interviewed, one nominee shall be recommended for each vacancy together with a total of three (3) alternates.
- f.* All those nominated are subject to approval by the legislature of the Undergraduate Student Government as advised by a representative of the board in attendance.
- g.* At every stage of this process, consideration shall be given to the appointment of at least one student from the undergraduate school and college.
- h.* Except that interim members as provided for in A(6) who have served for at least one (1) semester during their junior year will become regular members of the board for the following academic year as a matter of course.

- * A (4) *Selection of Faculty Members.* Faculty members of the board will be appointed by the duly empowered committee of the Undergraduate Faculty Council of Arts and Sciences through the Dean of Trinity College and Dean of Arts and Sciences and by the Dean of the School of Engineering.
- A (5) *Selection of the Dean Members.* Appointees will be deans in the undergraduate school and college, but will not include either the Dean for Student Life, the Dean for Residential Life or the Vice-President for Student Affairs, including their assistants.
- A (6) *Selection of Interim Members.*
 - a. Interim undergraduate vacancies on the board are to be filled through nomination(s) of one or more of the previously designated alternates by a concurrent vote of two-thirds (2/3) of the full board membership and subsequent approval by the legislature of the student government.
 - * b. Interim faculty vacancies are to be filled by the duly empowered committee of the Undergraduate Faculty Council of Arts and Sciences.
 - c. Any undergraduate member of the board who takes a leave of absence while remaining in good standing in the University will resume, upon return, the place previously vacated on the board.
 - d. Interim members will serve only to the end of the regular academic year whereupon the position held will be vacated and filled in the manner prescribed in A(3) through A(5).
 - e. But interim members serving during leaves of absence of regular members will terminate their duties and return to their former status as alternates upon return to service of that regular member.
- A (7) *Removal of Members.* The board may remove any member for cause by a two-thirds (2/3) majority of the full board. The vacancy so created will be filled forthwith in the manner prescribed in A(6).
- B (1) *Terms of Undergraduate Members.* Undergraduate members of the board will ordinarily serve during good behavior for terms not exceeding two years.
- B (2) *Terms of Faculty and Dean Members.* Faculty and dean members will serve two-year terms, subject to reappointment upon consent. To insure staggered terms, they may be appointed for a single year.
- C (1) *Board Organization:* The full board will elect, by majority vote, a Chairman and Vice-Chairman, both of whom must be undergraduates.
- C (2) *Board Calendar.*
 - a. *Regular Terms.*

The board or parts thereof will ordinarily hear and dispose of all pending cases in which charges have been preferred, during the regular fall and spring semesters, and following the end of spring semester.
 - b. *Summer Session Terms.*
 - 1. The Chairman will ascertain the local availability of board members for summer session service and those within a 200 mile radius who may be invited by the Dean for Student Life to serve at University expense.
 - * 2. The Chairman of the Undergraduate Judicial Board will provide the Dean for Student Life with a roster of board members available for service on the Undergraduate Judicial Board during all or any portion of the summer sessions.

3. The Dean for Student Life will constitute a five (5) member Hearing Committee from this list, appoint a chairman and provide an ordinary hearing committee including at least one (1) faculty member and two (2) students.
4. If the number of student members drawn from the rosters provided under C(2)(b.) (2) above is insufficient to constitute the hearing panel provided for in C(2)(b.) (3) above, the Dean for Student Life, with consent of the Chief Executive Officer of the Undergraduate Student Government, will appoint the necessary number of students drawn from the undergraduate student body.
5. The Summer Session Hearing Committee will function in the same manner and with the same procedure as a Regular Term Hearing Committee, except that the accused may not enjoy more than one (1) peremptory challenge.

C (3) *Duties of Officers.*

- * a. The Chairman, Vice-Chairman, or their designee, will preside over any meeting of the board or any meeting or hearing of a part thereof.
- b. The Chairman will maintain a roster of available members for the regular and summer session terms (see C[2]).
- * c. The Chairman and the Dean for Student Life or his/her designee will prepare a "Semester Report of the Undergraduate Judicial Board" to be issued in January and May. It will be a statistical survey designed to order cases: by volume, classification, disposition, and current status (e.g., filed, pending, heard, on appeal to Dean or to Vice-President for Student Affairs).
- * d. The Chairman and the Office of Student Life will prepare and issue an "Annual Report of the Undergraduate Judicial Board" to be compiled following adjournment of the board at the end of the spring semester. The contents will contain:
 1. A listing, by types of cases, of abstracts of all completely adjudicated cases.
 2. A statistical survey of the business of the board during the preceding academic year.
 3. A commentary on that business.
 4. Any recommendations which the board wishes to make.
 5. The "Annual Report" will be released prior to freshman registration in the fall semester and will constitute the basis of an early fall semester interview with the *Chronicle* to be held by the Chairman.
- * e. The Chairman and/or Vice- Chairman, as well as a representative of the Office of Student Life, will attend one meeting of UFCAS at the beginning of either semester to discuss the concerns of the board in relation to the faculty and the concerns of the faculty in relation to the board.
- * f. The Chairman and/or Vice- Chairman, as well as a representative of the Office of Student Life, will call a meeting with the Directors of Undergraduate Studies (DUS) at both the beginning and the end of each academic year. The DUS shall serve as the liaison between the UJB and the faculty. The DUS will:
 1. Apprise the faculty of the topics and issues covered in his/her meetings and with the Chairman and/or Vice-Chairman,

2. Receive copies of the board's opinions for all academic dishonesty cases and keep the opinions on file for faculty perusal,
3. Consult with faculty members in his/her department when academic dishonesty violations appear to have been committed. Records should be maintained of:
 - number of students suspected
 - number of students confronted
 - number of students referred to the UJB
 - number of students disciplined by the faculty member (action taken)
4. Encourage faculty to use the UJB when appropriate, and
5. Contact the Office of Student Life and/or board members, who will be available for consultation, when he/she or a faculty member wishes to discuss any matter relating to the UJB.

D (1) *Hearing Panel Organization.* Hearing panels will consist of seven (7) members as assigned by the Dean for Student Life in consultation with the Chairman or Vice-Chairman. Each hearing panel will consist of four (4) undergraduates, two (2) faculty members, and one (1) dean. One student member will be designated as Chairman of the panel.

D (2) *Modified Hearing Panel Organization.* In the interest of speedy disposition, a panel of reduced size may be convened, but in no panel shall it consist of fewer than five (5) members appointed by the Dean for Student Life in consultation with the Chairman or Vice-Chairman. Each such panel will consist of three (3) undergraduates, one (1) faculty member, and one (1) dean.

D (3) *Substitution of Hearing Panel Members.* Any member of a panel may, at his or her request, be excluded by the Chairman of the Board from sitting on any case. The Chairman of the Board will thereupon appoint a substitute member from among the relevant class of members of the board.

E (1) *Jurisdiction.* The board will exercise original jurisdiction over all cases:

- a. In which the accused is a named student in the undergraduate community defined as persons, including employees, currently enrolled in, not yet formally graduated from, or admitted and not yet matriculated or readmitted, and not yet matriculated to programs of the undergraduate colleges.
- b. Which fall without the jurisdiction of the University Judicial Board and the Residential Judicial Board.
- c. Which fall within the classification of offenses stipulated in the Judicial Code of the Undergraduate Community (see pp. 42-44) and the University Regulations and Policies (see pp. 45-59) in this bulletin.

F *Functions of Dean for Student Life.*

F (1) The Dean for Student Life or designee is responsible for receiving complaints, conducting investigations, gathering evidence, and preparing and preferring charges relating to offenses within the jurisdiction of the board.

F (2) The Dean for Student Life may appoint assistants, in such numbers and for such duties under his/her supervision in order to faithfully execute his/her responsibilities, as the Dean shall deem convenient and useful.

- F (3) The Dean for Student Life is responsible for maintenance of the records of the board. These records include:
1. A public permanent precedent file provided by panels. It consists of abstracts specifying charges, facts, case dispositions and rationales for such dispositions. Identification of the party or parties as well as of witnesses will be omitted.
 2. A permanent confidential case file.
- * F (4) The Dean for Student Life or his/her designee, jointly with the board, is responsible for recruitment, training, supervision, and direction of a staff of advisers available to accused students.
- G *Prehearing Procedures.* Upon receipt of a complaint, the Dean for Student Life or duly appointed assistants will:
- G (1) Promptly assemble and examine all evidence either material or relevant to the allegation in which task the Dean or the Dean's assistant shall enjoy prompt and full cooperation from all parties concerned. This investigatory process may include, but is not confined to:
- a. Receipt of any oral and/or written evidence including documents and records.
 - b. Interviewing the accused which interview must begin with notification by the Dean or assistant of: a right to remain silent, a right to an adviser as defined herein, a right to waive knowingly one or both of these rights as well as a written and signed acknowledgment by the accused attesting to an understanding of these rights (Cf. I(8)(a)).
 - c. Interviewing any holder of evidence.
 - d. Receipt from the accused of a written statement submitted in his or her behalf which document will become part of the case record.
- G (2) Promptly determine on the basis of the preliminary investigation whether or not there exists probable cause for believing that the accused person committed the alleged act(s).
- G (3) The Dean for Student Life is responsible for finding of probable cause. In determining whether to prefer charges against any accused, the Dean will consider:
- a. *Civil proceedings completed.* If, in the judgment of the Dean for Student Life, any civil or criminal liability the accused may have already incurred by reason of the action of any civil tribunal adequately vindicates the interest of the University in punishment of the accused, the Dean shall not prefer charges against the accused. The Dean shall, however, report to the Judicial Board finding of probable cause and reasons for not preferring any charge.
 - b. *Civil proceedings pending.* If any civil or criminal action is pending in any civil tribunal, and in the judgment of the Dean for Student Life, prompt trial before the Judicial Board would be prejudicial and unreasonably burdensome to the accused in respect to the civil tribunal proceedings, notwithstanding the finding of probable cause, the Dean for Student Life may defer preferring any charge. In making this determination, the Dean will consider the nature of the offense, the nature of the defense that may be offered in either the civil or University proceeding, the punishment that may be visited on the accused in either proceeding, the likely delay in the civil proceedings, any possible impairment of the accused's ability to defend him/herself in either proceeding by reason of its contemporaneous pendency and the preser-

vation of general peace and order within the University community. If, after a finding of probable cause, the Dean for Student Life decided either to defer preferring charges or definitely to abandon them in the situations covered by this paragraph, the Dean shall nevertheless report to the Judicial Board his/her findings of probable cause and reasons for deferring or abandoning the preferring of charges.

- c. *Civil proceedings in future.* If any civil or criminal action is threatened or likely, the Dean for Student Life will be governed by the same considerations set forth in paragraph (b.), and in addition by the degree of likelihood of civil or criminal proceedings against the accused. If, after a finding of probable cause, the Dean for Student Life decided either to defer preferring charges or definitely to abandon them, in the situations covered by this paragraph, the Dean shall nevertheless report to the Chairman of the Judicial Board the finding of probable cause and reasons for deferring or abandoning the preferring of charges.

G (4) In circumstances so warranting under G (3) a.-c. the sanction of interim suspension may be invoked. (See K (13)).

G (5) *Referral.*

- a. The Dean for Student Life may refer the case to the appropriate agency for resolution if that officer finds that the case, whether or not probable cause exists, falls without the board's jurisdiction.
- b. At any time prior to imposition of verdict and sanction, any member of a panel may object to further consideration of the case on grounds that the board lacks jurisdiction. Thereupon the panel must resolve the jurisdictional question raised. If a panel majority believes the board lacks jurisdiction over the case, the proceedings will be suspended, and the matter referred to the Chairman of the Board for subsequent resolution of the question by the full Undergraduate Judicial Board. The decision of a majority of those board members present will be final, and the case will be either retained by the board accompanied by referral back to the original panel or be referred to the appropriate agency for disposition.

G (6) *Terminate action and report this fact if:*

- a. No probable cause is found.
- b. After examination of the Undergraduate Judicial Code and the University Regulations, it is determined that commission of the alleged act does not violate any provision(s) found in the duly promulgated codes, rules, and regulations of the University.
- c. In the event that the Dean for Student Life should refuse or fail for any reason to receive complaints and/or conduct investigations, and/or find probable cause and/or prefer charges, an aggrieved party may appeal such action or inaction on grounds of new or different evidence previously unavailable. This step may be made by filing with the Chairman of the Board a typed petition entitled: "Petition to Find Probable Cause." Upon receipt of this petition, the Chairman of the Board will direct the Dean or will unilaterally appoint an investigator to find facts on the basis of which a full seven (7)-member hearing panel may determine the existence of probable cause sufficient to warrant a regular hearing in due course.

*G (7) *Probable Cause Notice: Undergraduate Judicial Board Hearings.* If probable cause is determined to exist, the Dean for Student Life will promptly draw up a written

notice to be transmitted to the accused together with a summons to appear for a panel hearing at the time and place specified. The notice will include:

- a. The charges.
- * b. Referral to text of the relevant provision(s) of the Judicial Code, rules, and regulations.
- * c. Any additional evidence produced during the investigative process.
- d. A statement of procedural rights available to the accused.
- e. Any other material which the board may instruct the Dean for Student Life to supply the accused.
- f. The signature of the Dean for Student Life or appointed assistants.
- g. List of members of the panel designated to hear the case.

*G (8) *Probable Cause: Administrative Hearings*. Should the Dean for Student Life, after consulting with the Chairman of the Undergraduate Judicial Board, determine that either the nature or related extenuating circumstances of a case render it amenable to the administrative hearing alternative provided for in H(1)(b.), a written notice will include explicit notice of the availability of such forum to an accused who signs a waiver of the right to a formal hearing before the Undergraduate Judicial Board. Administrative hearing decisions are final; no appeals may be taken from them with the exception of a sanction of suspension or expulsion. (See Section L.)

G (9) Prepare a written report of findings and transmit that report to the appropriate tribunal. This report will contain a copy of the probable cause notice (G (8)), all evidence gathered in the preliminary investigations, with its sources and statement of the rights of the accused. Nowhere in this report will a personal opinion be expressed as to the merits of any evidence, or as to the guilt or innocence of the accused. However, where there are conflicts in the evidence the Dean will draw the attention of the panel to them. The report shall become a part of the written record of the hearing.

G (10) Subpoena witnesses as directed by the Chairman of the hearing panel.

*H (1) *Administrative Hearings*.

- * a. For academic dishonesty violations, an accused may request that his/her case be heard by the appropriate Dean of his/her college or school, who may refuse to hear it. In all non-academic violations, the accused may request that his/her case be heard by the Dean for Student Life and/or that officer's designee(s) as specified in G(8). In fixing the sanction, the Dean or designee(s) is(are) governed by all penalties enumerated in Section K of the code. Administrative hearing decisions are final; no appeals may be taken from them with the exception of a sanction of suspension or expulsion. (See Section L.)
- * b. The Dean for Student Life and/or that officer's appointee(s) will confer at the earliest convenient time with an accused who met the requirements specified in G(8).
- c. The Chairman of the Board will receive prompt notification of hearings held under a. and b. above and a copy of the case abstract as defined in J(14)(b.).

* I *Undergraduate Judicial Board Prehearing Procedures*.

I (1) *Charge required*.

- a. No case may be heard by the board in the absence of a finding of probable cause by the Dean for Student life and a clear statement of the charges against the accused or by direct petition to the board. (Cf. G(7) and G(6)c)
- * b. The Dean's signature on the Probable Cause Notice (G (7)) attests to a sufficiency of inculpatory evidence, existence of the board's jurisdiction, and the completeness of the charges.
- * I (2) *Hearing Schedules*. The hearing, based on contents of the Probable Cause Notice (G (8)) will take place speedily, ordinarily within thirty (30) days following presentation of charges to the accused.
- * I (3) *Notice*. The accused will be given at least forty-eight (48) hours notice prior to the hearing or prior to continuation of a hearing recessed under J(8) subject to waiver as provided for in I (4).
- * I (4) *Waiver*. The accused may waive by a signed written statement the notice and/or the forty-eight (48) hour rule with reference to I (3) above and I(11)b) below.
- I (5) *Continuances*. Should the accused desire additional time to prepare his or her defense, a petition to that effect may be directed to the Chairman of the Board not less than twenty-four (24) hours prior to the scheduled hearing. In the Chairman's discretion, the accused may be granted a hearing delay of reasonable duration.
- I (6) *Contempt*. A willful or deliberate action on the part of the accused to impede, obstruct, unduly delay, or interfere at any stage with, in any manner, the proceedings then or thereafter before or potentially before the board may be deemed an act or acts in contempt of the board as determined by a majority of the relevant panel after issuance of a "show cause" order and in a separate regular proceeding held notwithstanding failure of the accused to appear in defense. K(12).
- I (7) *Removal and Challenges*.
 - a. Voluntary Removal. Board members may excuse themselves from a hearing panel for any reason (see D(3)).
 - b. Recusal. No person presenting evidence against the accused may at any time sit in judgement upon the accused.
 - c. Challenges.
 - 1. For Cause. The accused has the right to challenge on the grounds of prejudice any member of the hearing panel sitting on his/her case. If an accused makes such a challenge, the panel shall deliberate in private to determine whether cause exists. By majority vote of the members of the panel (excluding the member being challenged), a member shall be removed from the case, and replaced by a member of the board designated by the Chairman of the Board.
 - 2. Peremptory.
 - a. In addition, the accused may exercise a peremptory challenge directed at not more than seven (7) panel members even if a new trial on an amended charge is required. (Cf J(8)d).
 - * b. At the time the accused is informed of the hearing date, he/she shall be presented with a list of the members of the panel designated to hear the case.

- c. If the accused wishes to make a peremptory challenge(s), he/she shall make the challenge(s) in writing to the Office of the Dean for Student Life within forty-eight (48) hours of the notification of the scheduled time of the hearing.
- d. The Office of the Dean for Student Life will transmit this challenge to the Chairman of the Board, who will excuse the panel challenged, and refer the accused to the next panel in rotation.
- e. The accused retains the right to challenge for cause whether or not he or she has used the seven (7) peremptory challenges except as noted in C(2)b and C(5).

I (8) *Adviser*

- a. *Right to Adviser.* The accused enjoys the right to have an adviser. The Dean for Student Life will assign the accused an adviser at notification of the investigation. The accused may decline the assigned adviser and may select any other member of the University community except members of the board, or the accused may select no one. (G(1)b).
- b. The function of the adviser is to advise the accused in the preparation and presentation of his or her case, but the adviser may not directly address the panel nor any other participants during the formal hearing proceedings.
- c. Witness or witnesses as defined in I(10)a may request the panel chairman to permit the presence of adviser during hearing proceedings under conditions enumerated in I(8)a and b.

I (9) *Role of Accused.*

- * a. *Presentation of Case.* The accused enjoys the right and will be advised of the right to produce witnesses, introduce documents, and offer testimony in his or her own behalf. The accused may present no more than two written character references to be submitted to the hearing panel prior to the hearing.
- b. *Testimonial Rights.*
 - 1. The accused enjoys the right against self-incrimination, the right to remain silent respecting the charges brought against him/her, before, during, and after the hearing. No inference of guilt may be drawn from the silence.
 - 2. But any evidence pertinent to the charges volunteered by the accused may be used as evidence against him/her.
 - 3. If the accused elects to offer testimony on a specific act of misconduct, he/she waives a right to continued silence, and must answer truthfully all questions pertaining to the act.
- c. *Examination of Witnesses.*
 - 1. Under the supervision of the panel chairman, the accused may question directly any witness.
 - 2. The moving party or the accused, with or without the adviser's assistance, may submit questions in writing to the chairman of the hearing panel or during the proceedings.
 - 3. The chairman must ask such question(s) so submitted unless they are unfair and/or irrelevant and/or purely capricious.
 - 4. A copy of the written questions will be appended to the record.

I (10) *Witnesses.*

- a. *Defined.* Any person with direct knowledge relevant to a case pending before the board is a material witness.
- b. *Duty to Appear.* The Dean for Student Life may require the appearance of material witnesses or, upon the written request of the complainant and/or the accused, the Dean will require the appearance of such witnesses.
- c. *Notice to.* The Dean for Student Life will notify such witness(es) in writing of the time, place, and purpose of their appearance as well as of the right against self-incrimination.
- d. *Contempt of.* Willful and deliberate failure and/or refusal of any material witness to honor a subpoena authorized by the board and duly served by the Dean for Student Life or a representative may be deemed an act in contempt of the board.

I (11) *Discovery.*

- a. No extrinsic evidence. In reaching its judgment, a panel will consider only the report of the Dean for Student Life, documents submitted into evidence, and the testimony of: moving party(ies), accused, and witnesses at the hearing.
- * b. The accused has the right to examine the written statement of any witness which is relevant to the case at least forty-eight (48) hours prior to either the hearing or continuation of a hearing recessed under J(8) subject to waiver as provided for in I(4).
- c. *Confrontation.* The accused has the right to confront any witness who has given a statement relevant to the pending case.
- d. *Excuse priority.* Any student whose presence is required at a hearing will be excused from any other University responsibility which might prevent, impair, or delay his/her presence before a panel, and both the board and the Dean for Student Life will employ their good offices to assist such students in making satisfactory arrangements.

I (12) *Closed Hearings.* The hearing will be closed unless the accused requests an open hearing. If any objection to an open hearing is lodged, the panel will decide the issue by majority vote and, if negative, the accused will receive from the panel a written statement of reasons for rejection of his/her request.

J *Hearing Procedure.*

- J (1) *Opening.* The Chairman will open the proceedings by noting the date, identity of the party(ies), the charges, and identity of all panel members.
- J (2) *Plea.* The accused will then plead guilty, not guilty, guilty in part and not guilty in part, or move to postpone the hearing for good cause shown.
- * J (3) *Report of the Moving Party.* At this time, the Chairman may invite the moving party(ies) to make a statement, not to exceed five (5) minutes, summarizing the essential facts and expressing opinions thereon. At any point prior to this stage of the hearing, the moving party(ies) may decline such invitation.
- J (4) *Case for Accused.* The Chairman of the panel will request the accused to present his or her case. (See I(7)c(1) and I(7)c(2), I(8)b, I(9).) The accused may waive this right by a verbal declaration (See I(9)b.)

J (5) *Witnesses.*

- a. All witnesses will be sequestered at the commencement of proceedings and will appear before the panel consecutively. But the panel Chairman may suspend this rule and direct attendance of all witnesses in the hearing room.
- b. The accused may call and direct questions to witnesses as prescribed in I(9)a and c, respectively.
- c. The panel may call and question witnesses.

J (6) *Examination of Witnesses.*

- a. Under the supervision of the panel chairman, the accused may question directly any witness.
- b. The moving party or the accused, with or without the adviser's assistance, may submit questions in writing to the Chairman of the hearing panel before or during the proceedings.
- c. The Chairman must ask such question(s) so submitted unless they are unfair and/or irrelevant and/or purely capricious.
- d. A copy of the written questions will be appended to the record.

J (7) *Evidentiary Rules.*

- a. All evidence which the panel considers relevant will be admitted including hearsay and expressions of opinion.
- b. Wherever possible oral testimony rather than written statements should be presented.
- c. Statements made by unidentified witnesses or those absent at the hearings, neither of which can be confronted by the accused, may not constitute a sole or substantial basis for conviction.
- d. No evidence obtained through unlawful search and seizure or in violation of the *University Statement on the Privacy of Students' Rooms* will be admissible at the hearing.

J (8) *Recess and Termination of Hearings.*

- a. The Chairman may recess hearings for a short duration of time in order to facilitate the work of the panel.
- b. By vote of a majority of the panel members, hearings may be recessed for an extended duration of time in order:
 - 1. to accommodate extraordinary circumstances such as personal emergencies
 - 2. to acquire additional evidence or testimony
 - 3. to provide adequate time for considering and setting sanctions (see: I(3) and I(11)b.)
- c. A witness or accused enjoys the right to a brief recess after a lapse of one (1) hour from commencement of the official record as provided for in J(14)a.
- * d. However, no recess may be declared for the purpose of amending the original charges against the accused. If it is determined during the hearing and

prior to verdict and judgment that the charges must be amended,

- (1) with the unanimous consent of the hearing panel and the agreement of the Accused, the charge(s) may be amended and the hearing may continue, or
- (2) without the unanimous consent of the hearing panel or the agreement of the Accused, the hearing must be terminated without prejudice and the procedures set forth in Section I reinstated.

* J (9) *Status of Accused Pending Verdict and Appeal (Interim Suspension)*. Pending verdict on charges (including appeal) against the accused, the status as a student cannot be changed, nor the right to be on campus or to attend classes suspended, except as provided for by the interim suspension rule (K(13)).

J (10) *Verdict and Sanction*.

- a. After the hearing closes, the panel will consider its verdict and sanction in closed session.
- b. The verdict is a determination of guilt or innocence. A guilty verdict is based on the existence of clear and convincing evidence that the accused committed the act(s) alleged in the charge.
- c. The sanction is a statement of the punishment imposed drawn from those enumerated in Section K below.
- d. Verdict and sanction will be determined by a majority vote of a panel except that any judgment of expulsion (see K(1)) or suspension (see K(2)) must be concurred in by not less than four (4) members of a five (5) member panel nor less than five (5) members of a seven (7) member panel.

J (11) *Special Master*. At any stage in the proceedings, involving complicated technical or professional subject matter, and at the request of any party or any or all members of a panel, a special master may be appointed by the Chairman of the Board in consultation with the appropriate dean. The special master will render advice to the panel. On the motion of any party or any member of the panel, proceedings may be recessed pending the receipt of the special master's report.

J (12) *Rehearing*. A panel by a majority vote may decide to rehear a case in which significant new evidence can be introduced in behalf of the accused.

J (13) *Notification of Verdict and Sanction*.

- a. The Chairman of the panel will promptly inform in writing the Dean for Student Life of the decision of the panel, but initial notification may be oral followed by the written abstract as required by J(14)b.
- b. The Chairman of the panel or the Dean shall promptly notify the defendant of the verdict and sanction imposed, and shall, at the same time, inform him or her of rights of appeal.
- c. At the request of the moving party(ies), the Dean for Student Life may, but is not required to, inform that person or persons of the panel's verdict and/or sanction.

J (14) *Record*:

- a. Tapes: A separate tape recording will be made for each hearing, clearly labelled, and retained for three (3) years.
- b. Abstract: A written abstract of each case will be made by completion of a "Hearing Committee Report Form" signed by the panel chairman.

- K *Sanctions.* The board is empowered to impose singly or in combination penalties of four (4) classes.

CLASS I

- K (1) *Expulsion.* Dismissal and permanent removal from the University without possibility of readmission. University censure automatically applies.

- K (2) *Suspension.*

- a. Under the voting rules set forth in J(10)d, dismissal from membership in the University for a specified period of time, ordinarily including the current semester and the next succeeding one, and such additional semesters as deemed appropriate by the panel.
- b. Readmission as a student in good standing is contingent upon satisfaction of any conditions stated in the original sanction.
- c. Upon reacceptance to and matriculation in the University the student is placed on disciplinary probation K(4) for a specified period of time.
- d. As suspension constitutes an involuntary withdrawal from the University an entry to that effect is made on the student's permanent academic record for the duration of suspension.
- e. University censure (class II) may be applied as determined by the panel.

- K (3) *Suspended Suspension.*

- a. For a specified period of time, the penalty of suspension is imposed, but suspended due to the existence of facts deemed mitigating by a panel.
- b. A disciplinary probation period must run concurrently and may run consecutively with suspension.
- c. As no involuntary withdrawal actually occurs, no temporary entry to that effect is made on the student's permanent record.

- K (4) *Probation.*

- a. *Disciplinary Probation.* Placing the student on a probationary status for violation of any regulation may result in suspension if adjudged guilty of subsequent infraction.
- b. *Revocation of Disciplinary Probation.* In the event that a student has been placed on disciplinary probation by the Undergraduate Judicial Board and subsequently is convicted of violation of a regulation by the University Judicial Board, the revocation of his or her probation will not automatically occur. In such a case he or she shall be entitled to a hearing before a panel of the Undergraduate Judicial Board, said hearing being limited to the issue of whether his or her probation should be revoked as the result of the original conviction and the conduct which gave rise to a second conviction.

- K (5) *Exclusion.*

- a. from public participation or performance in the name of the University other than performance of duties as an elective officer.
- b. from application for, retention of, or any other possession of a University housing license.
- c. from access to, use of, and occupation of specified University-owned premise and/or facilities.
- d. from application for, retention of, or any other possession of a traffic and parking permit.

e. from application for, retention of, or any other possession of IM privileges.

- K (6) *Warning*. A formal written admonition but which explicitly states the certainty of more severe disciplinary sanction for conviction of a subsequent violation during a stated period. A warning may be entered on the student's Dean's card citizenship record at the discretion of a panel.
- K (7) *Restitution*. Payment for all or a portion of injury or damages to person(s) or property caused by commission of an offense.
- K (8) *Fine*. Payment to Duke University of a reasonable sum of money set by a panel which may also impose a community service sanction as provided for in K(9)a or b below.
- K (9) *Community Service*. Specified hours of service set by a panel during which period a student will perform as either
- a. a regular employee in the University student labor pool, or
 - b. a "volunteer" worker in a charitable enterprise in Durham city or county as arranged for and supervised by the Dean for Student Life.

CLASS II

- K (11) *University Censure*.
- a. Official entry on a student's permanent record, of serious misconduct including both the fact of the censure and the exact nature and circumstances of the offense.
 - b. This sanction is never applied unless in combination with serious offenses meriting imposition of sanction K(1)-(2). Censure indicates the seriousness of the offense and the absence of mitigating circumstances.
 - c. Application of this sanction requires a separate vote of a panel under J(10)d unless accompanying Expulsion K I(l).

CLASS III

- K (12) *Temporary Exclusion*. Exclusion from registration, enrollment, or matriculation at the next ensuing semester, including semesters of summer session or eligibility to graduate from Duke University pending relief from verdict and sanction by compliance in good faith with the original order, directive or subpoena. This penalty is ordinarily used in contempt proceedings described in I(6) and I(10)d.
- K (13) *Interim Suspension*.
- a. An extraordinary remedy invoked only in extreme cases requiring immediate action prior to a panel hearing.
 - b. If the Dean for Student Life deems any student's presence on campus, at any time to constitute a threat to the general peace and order of the University community and to its several members that officer may so notify the Provost or Chancellor, who may, in his or her discretion, suspend the named student from the University for a three (3)-day period pending a hearing before a duly constituted panel of the board.
 - c. If the student or board requires a continuance the interim suspension may be extended by the Provost or Chancellor or by a duly constituted panel of the board.
 - d. If interim suspension is imposed and the accused is later found innocent, the University will grant restitution as provided by the Undergraduate Judi-

cial Board with respect to that student's academic responsibilities incurred during the period of suspension.

K (14) *Temporary Restraining Order.*

- * a. A formal written ex parte order issued by
 - (1) a duly constituted panel, or
 - (2) the Dean for Student Life in consultation with the Chairman of the Board where possible,directing a named actor(s) to cease and desist from engaging in behavior deemed contrary to one or more provisions of the Undergraduate Code. [See I(6) and K(12)].
- b. Such TROs are of twenty-one (21) days duration but are renewable only through regular panel proceedings.

CLASS IV

K (15) *Counseling Recommendation.* If a panel majority believes that a student would benefit from professional counseling, it may recommend such action to the Dean for Student Life who may so advise the student.

L *Appeal.*

L (1) *Right of Appeal.*

- a. Appellant may appeal any verdict and sanction of the board to the dean of the relevant undergraduate college or school in any case involving academic dishonesty. In all cases involving infractions other than academic dishonesty appellant may appeal the verdict and sanction of the board to the Vice-President for Student Affairs.
- * b. After consideration by one of the following,
 - (1) The Dean of the appropriate college or school, or
 - (2) the Vice-President for Student Affairs, or
 - (3) The designee of either of the above appellant officers,the second level of appeal shall be the President of the University.

L (2) *Form and Time of Notice to Appeal.* Notice of appeal must be in writing and submitted to the relevant dean, unless waived by him, within forty-eight (48) hours after receipt of the verdict and judgement.

L (3) *Form and Time of Actual Appeal.* A written statement clearly and briefly setting forth grounds for appeal must be submitted to the relevant dean, unless waived by the officer within seven (7) days after receipt of the verdict and sanction.

* L (4) *Exclusive Grounds for Appeal.*

- a. Procedural error substantially affecting the rights of the accused.
- b. Incompatibility of the verdict with the weight of the evidence.
- c. New evidence of a character which may have affected the verdict but on which basis rehearing was denied by the board.
- d. Proven case of extreme personal hardship as a result of the board's action.

L (5) *Appeal Procedures.*

- a. The relevant administrative officer of the University may not hear testimony *de novo*.
 - * b. With the consent of an appellant, the administrative officer may consult with other members of the University community as he/she chooses only to substantiate the grounds for appeal. (See L(5)a.)
 - c. He/she shall receive documents submitted by the panel including tapes, abstracts, written opinions, and dissents.
 - d. The appellant may prepare for his/her defense with the assistance of an adviser and may at his/her expense make a transcription of the tape.
 - e. The appellant must submit a written statement setting forth grounds for his/her appeal as required by L(3) and the supporting arguments.
 - f. The appellant has a right to make an oral statement to the dean to amplify his/her written arguments. This administrative officer may question the defendant at this time about his/her oral statement or written statement, but shall confine himself or herself to the issues on appeal. These additional statements and arguments shall be recorded.
 - * g. Either the chairman or the relevant hearing panel or the administrative officer charged with the responsibility for hearing the appeal may request a conference between themselves to consider issues arising out of the case. A notation of substantive issues discussed in any such conference shall likewise be incorporated in the record.
 - * h. In cases where a hearing panel's verdict and/or sanction is reversed, the hearing panel may request a conference with the appellant officer responsible for the reversal.
- L (6) *Appeal to President*. The appellant may appeal an unfavorable decision of the administrative officer to the President of the University who may, in his or her discretion entertain such appeal, under such conditions and with such procedures as he or she may prescribe. The President will notify the Board Chairman of the decision.
- L (7) *Notification*.
- a. In all cases the relevant administrative officer or President of the University will submit to the Chairman of the Board, with a copy to the Dean for Student Life a written statement of the decision and reasoning on which it is based.
 - b. Such administrative officers will promptly communicate their decision to the appellant.
 - * c. The appellant officer will inform the moving party(ies) of the outcome of his/her decision.
- M *Amendment of Article IV*.
- M (1) Article IV, "The Undergraduate Judicial Board," may be amended at any time by the Vice-President for Student Affairs only on the recommendation of a permanent Advisory Committee on Judicial Codes composed of undergraduates, faculty, and deans appointed by and acting under that officer's supervision and direction.
- M (2) All amendments promulgated by the Vice-President for Student Affairs shall be effective from and after the date of promulgation.

*1988 revision of substance.

Appendix D

The Residential Judicial Code

Preamble

A basic part of living in the Duke undergraduate community is every member's recognition of and maintenance of those factors which support and foster a harmonious residential life. Among them are: (1) a living situation conducive to and supportive of academic pursuits, (2) privacy, (3) maturity and responsibility of both individuals and living groups, (4) security, (5) financial responsibility, (6) individual and group freedom of life style that does not infringe upon the liberty of other individuals or living groups, (7) an atmosphere of discretion and consideration regarding personal matters.

In recognition of the responsibility of each undergraduate to adhere to these fundamental rights of all the duties of each, the University and its student-operated institutions treat every person as a mature individual. And the University accords recognized residential living groups certain privileges including: (1) priority use of a residential section, including commons room areas, (2) priority of its members with regard to room selection within the section, (3) use of University facilities, (4) loan privileges from the University, (5) the use of University purchasing channels.

In the event of conflicts arising within the undergraduate community, impartial institutions exist for their peaceful resolution with due regard for the rights, privileges, and duties of each member or several members of the Duke residential community.

Article I: The Residential Judicial System:

The Residential Judicial System includes those of the several residential units and consists of (1) such committees, councils, or boards composed of elected or appointed resident members and constituted for a single unit or for more units than one as may exist or be subsequently established to adjudicate conflicts, (2) the Interfraternity Council Judicial Board (IFCJB), and (3) the Residential Judicial Board with campus-wide adjudicatory power as defined below. The system's jurisdiction includes conflicts in "the Judicial Code of the Undergraduate Community" in this bulletin at pp. 42-44 but which fall outside the jurisdiction of the University and Undergraduate Judicial Boards as well as those related to relevant provisions of the "Care of Dormitory Rooms and Adjacent Campus Areas," "House Dues Policy," "Violation of Housing License," and "University Policies and Regulations" in this bulletin at pp. 47-61.

Article II: House Judicial Systems

- A. Each residential unit may establish a suitable organization for adjudication of intra-unit conflicts.
- B. Such organization must establish and promulgate procedures for processing its business.
- C. Any resident(s) of such unit may bring a case before the organization as established and the Dean for Residential Life may refer cases to it.
- D. The house adjudicatory organization may refer any case within their cognizance to the Dean for Residential Life for reference to the IFCJB, the Residential or Undergraduate Judicial Board see M(2)(3).
- E. The following penalties may be imposed:
 - 1. Censure
 - 2. Fine

3. Restitution
 4. Exclusion from social activities
 5. Forfeiture of room drawing priority
 6. Recommendation to the Residential Judicial Board of cancellation of room contract.
- F. Every judgment of any house adjudicatory organization will be filed with the Dean for Residential Life within 24 hours of its release. The Dean will thereafter certify that judgment as a final disposition of the case or direct, on petition of the original aggrieving party or on the Dean's own motion, that the Residential Judicial Board hear it as an appeal.
- G. If a house adjudicatory organization fails to enter a judgment in any case within twenty-one (21) calendar days after receiving it, the Dean for Residential Life may transfer that case to the Residential Judicial Board.

Article III: Upperclass Housing Association Judicial Board (UHAJB)

- A. Two or more nonfraternity upperclass residential units may establish a common organization for adjudication of conflicts: (1) between and among such residential units, (2) between and among residents thereof, and (3) between residential units and residents.
- B. The organization and procedures of the UHAJB will be analogous to those provided for the IFCJB in Article IV below.

Article IV: Interfraternity Council Judicial Board (IFCJB)

- A. Fraternity units may establish an Interfraternity Council Judicial Board with such organization and procedures as provided for in the Constitution and By-Laws of the Interfraternity Council which are consistent with the provisions of this Article.
- B. Any member of a fraternity unit may bring a case before the IFCJB and the Dean for Residential Life may refer cases to it.
- C. The IFCJB will enjoy exclusive original jurisdiction in cases which involve only (1) Fraternity units and their members, (2) Property belonging to either or both, and (3) Interests affecting either or both. Included are:
1. rush and pledge rules and regulations.
 2. "hazing" as defined in this bulletin on p. 53
 3. damage to off-campus private, real, or personal property.
 4. actions between and among fraternity residential units, between and among fraternity members, and between fraternity residential units and fraternity members.
- D. In all other cases involving fraternity residential units the board is eligible to obtain jurisdiction of a case(s) under the following procedure.
1. The Dean for Residential Life notifies in writing the Chairman of the IFCJB that one or more named fraternity residential units are parties to the case.
 2. Within three (3) class days (72 hours) of receipt of notification of the IFCJB Chairman, files with the Dean for Residential Life a petition advancing grounds for referring the case(s) to the board for adjudication in the first instance.

3. The Dean for Residential Life at his or her discretion, consistent with the “important case” criteria set forth in N(2), determines that the case(s) should be referred to the IFCJB.
- E. The following penalties may be imposed:
1. Censure
 2. Fine
 3. Restitution
 4. Community volunteer services performed under the supervision and direction of the Dean for Residential Life.
 5. Suspension or probation for a specified time period from one or more enumerated activities cosponsored, sponsored, or performed by a fraternity residential unit made as a recommendation to the Dean for Residential Life.
 6. Suspension or revocation of the privilege of a fraternity residential unit to exist at Duke University made as a recommendation to the Dean for Residential Life.
- F. Temporary restraining orders of twenty-one (21) days duration, renewable by action of the IFCJB, may be issued ex parte by that Board directing named executive officers of a fraternity residential unit(s) and/or named member(s) thereof to cease and desist from specific action within the board’s jurisdiction. Noncompliance with such order constitutes contempt of the IFCJB. That board may refer the case directly to the Dean for Residential Life with a recommendation for action by Undergraduate Judicial Board.
- G. Every judgment of the IFCJB will be filed with the Dean for Residential Life within 24 hours of its release. The Dean will thereafter certify that judgment as a final disposition of the case or direct the Residential Judicial Board to hear it as provided for in Section H below.
- H. A judgment of the IFCJB may be appealed to the Residential Judicial Board by the original aggrieving party or, in exceptional circumstances, by the Dean for Residential Life.
- I. If the IFCJB fails to enter a judgment in any case within twenty-one (21) calendar days after receiving it, the Dean for Residential Life may transfer that case to the Residential Judicial Board.
- J. The IFCJB may refer any case within their cognizance to the Dean for Residential Life for referral to the Residential or Undergraduate Judicial Board [See N(2)(3)].

Article V: The Residential Judicial Board

- A. A Residential Judicial Board (RJB) is established.
- B. *Size.* The board is composed of fourteen (14) undergraduate members.
- C. *Terms.* These members will serve one (1) year terms but for not more than two (2) consecutive one (1) year terms. After two (2) consecutive one (1) year terms, incumbent members of the board may reapply for continued service on the board under procedures specified in V(D).
- D. *Selection.* Solicitation for membership will be by public notice. Interested applicants from all classes except graduating seniors will submit written statements indicating their interest in an appointment to the board. From among these applicants, the nonreturning members of the board augmented by one (1) representative of the undergraduate student government, appointed by that government’s Executive Com-

mittee, will constitute a selection committee of not less than three (3) members. The Executive Committee of the student government will appoint sufficient members of the committee to constitute at least a membership of three in the event that there exists fewer than two (2) nonreturning board members.

- E. (1) The Selection Committee may interview all, but must interview at least two (2) candidates for each vacancy on the board unless there are fewer than two (2) such candidates available. (2) In making the appointments, consideration should be given by the committee to providing a board broadly representative of the Duke undergraduate residential community.
- F. All members so selected must be duly approved by the student legislature.
- G. *Interim Vacancies.* Interim vacancies may be filled for the remainder of the academic year, by a majority vote of all members of the board.
- H. *Removal.* Removal of any member for cause requires a two-thirds majority of all board members. Such an interim vacancy must be promptly filled.
- I. *Organization.* The board will elect a Chairperson, a Vice-Chairperson, and a Secretary. The Secretary will keep permanently filed minutes of all actions of the board.
- J. *Reports.* The proceedings and decisions of the board are ordinarily confidential matters see P(3). However, the board in its discretion may issue general policy statements related to a specific class or classes of a case or cases previously adjudicated and at least once a year or more often as determined by the board, a public statistical report must be issued on business conducted during the preceding time period.
- K. *Quorum.* Five (5) members of the board may, in its discretion, adjudicate cases involving money amounts aggregating less than \$25, by instituting publicly known procedures using fewer than five (5) members.
- L. *Voting.* Final decisions of the board are to be made by a simple majority vote. The chair may vote only in the case of a tie.
- M. *Jurisdiction.* The board has jurisdiction over all disputes arising in residential unit(s) which are not within the jurisdiction of the University Judicial Board or Undergraduate Judicial Boards [but note M(3) below]. Its jurisdiction includes:
 - 1. all appeals from judgments rendered by any house or other duly constituted judicial board provided for in Articles II, III, or IV.
 - 2. original jurisdiction in the absence of a house judicial system as defined in Article II and as set forth in N(1) below.
 - 3. violation of the Judicial Code of the undergraduate community (see this bulletin, pp. 42-44) by residential units or by other cohesive units or by unnamed members thereof.
 - 4. noise abatement. [See *Noise* 1(c)(d).]
 - 5. claims relating to damage to, destruction of, or theft of private, real or personal property located on or off the premises of Duke University.
 - 6. monetary assessments. [See "House Dues Policy" in this bulletin.]
 - 7. any of the above or other disputes affecting the general peace and order of the Duke community, not subject to Undergraduate Judicial Board jurisdiction between:

- a. different living groups
 - b. individual student(s) of different living groups
 - c. individual student(s) of one living group and a different living group(s)
 - d. an individual or group of individuals and their own living group
8. charges of contempt against any student or residential unit which has acted to impede, obstruct, delay, or otherwise interfere with the proceedings or judgment of the Residential Judicial board.

N. *Presentation and Referral of Cases.*

- 1. Any aggrieved undergraduate or group(s) of undergraduates, who or which has/have previously made reasonable and good faith efforts to resolve a dispute through utilization of other existing remedial procedures, may petition for a board hearing of an issue properly within the board's jurisdiction, either directly or through the Office of the Dean for Residential Life.
- 2. The Dean for Residential Life or a duly authorized agent/appointee may, on his/her own initiative or on the recommendation of others, including but not restricted to an aggrieved party or parties, resident advisers, faculty members, the Undergraduate Judicial Board, law enforcement officers, and officials of Duke University, present directly to the board important cases properly within its jurisdiction.
- 3. The Residential Judicial Board may refer, at any time, cases to the Dean for Residential Life with a recommendation that proceedings be initiated pursuant to the jurisdiction of the Undergraduate Judicial Board.

O. *Sanctions.* The Residential Judicial Board may impose the following sanctions:

- 1. censure
- 2. reprimand
- 3. specified or general probation for a fixed time period
- 4. restitution
- 5. fine
- 6. forfeiture of room drawing priority
- 7. cancellation:
 - (a) of room license
 - (b) of campus traffic and parking permit with or without refund of fee
- 8. suspension for a specified time period of one or more enumerated activities cosponsored, sponsored, or performed by a residential unit or units or by any other cohesive unit or units.
- 9. recommendation to the Dean for Residential Life that the privilege of a residential unit or units or of any other cohesive unit or units to exist at Duke University be suspended or revoked.
- 10. community service for specified hours set by the board during which period a student will perform as either:
 - (a) a regular employee in the University Student Labor Pool or

- (b) a “volunteer” worker in a charitable enterprise in Durham city or county as arranged and supervised by the Dean for Residential Life

11. *ex parte* order of the board issued to any subject within the board’s jurisdiction enjoining from and directing to cease and desist from continuing to cause, causing or threatening to cause any dispute(s), disorder(s), damage(s), or any other act(s) within the jurisdiction of the board [See P(8)(d)]

P. *Procedures.*

1. *Notice and Hearing.* The parties involved must receive timely written notice of the charges levied as well as the time, date, and place of the hearing and composition of the board. At the hearing, they may present evidence and confront and examine witnesses.
2. *Speedy Hearing.* The hearing of all charges shall normally take place within ten class days following the presentation of the charges to the parties involved. However, upon the written request of either party, a continuance of reasonable duration may be granted by the board for good cause.
3. *Hearings Closed.* The hearing will be conducted in private unless all parties involved in concurrence with the Residential Judicial Board request an open hearing.
4. *Right to Adviser.* Each of the parties involved may be assisted by an adviser of his/her choice from the University community. However, the adviser may address no party other than the advisee.
5. *Conflict of Interest.* No interested party may sit in judgment upon a case.
6. *Challenges.* The parties involved shall have the right to challenge on the grounds of prejudice any member of the board not less than twenty-four (24) hours prior to the scheduled hearing. The Chairman may, in his or her discretion, expeditiously grant the challenge and accordingly reconstitute the board. If the Chairman refuses or fails to act affirmatively toward the challenge or is the one actually challenged, the board shall deliberate in private to determine whether cause exists. By a majority vote of the members of the board (excluding the member against whom the challenge is made), that member shall be removed from the case, provided that the parties involved may not exercise a challenge directed at the entire Residential Judicial Board.
7. *Discovery and Evidence.*
 - (a) The party(ies) involved are entitled to examine all documents and other tangible evidence submitted in conjunction with a case at least seventy-two (72) hours prior to a hearing.
 - (b) Depositions, reports, statements, or other written material may be introduced at the hearing, but may not serve as conclusive evidence for any judgment rendered by the board.
8. *Witnesses and Others.*
 - (a) A material witness before the board is defined as a person or persons who has(have) been served with and directed by a written summons, issued by the Dean for Residential Life or by that officer’s designee [see N(1)(2)], to appear before the board at a specified time and place for the purpose *and* who either (1) has or may have direct knowledge of a case(s) under the board’s consideration or (2) is an officer of a residential or other cohesive unit against which a complaint has been lodged under M(3).

- (b) In the absence of a material witness *other than* the alleged offending party(ies), the case must either be remanded to the Dean for Residential Life or dismissed.
 - (c) Any person whose presence is required by the Residential Judicial Board shall be excused from any other University responsibilities which would conflict with his/her presence before the board. The appropriate dean will notify all concerned parties of the excused absence.
 - (d) Failure of any person to comply with a summons or otherwise deliberately to impede, obstruct, unduly delay or to interfere at any state with, in any manner, the proceedings of the board may be deemed an act or acts in contempt of the board if, following issuance to the contemner of a "show cause" order conforming with procedures provided in Section P(1)(2), a majority of the members present is determined. Accompanied by supporting material [see P(13)] the case of a person cited for contempt will be promptly referred by the Chairman to the Undergraduate Judicial Board in accordance with the procedure in Section N(3).
 - (e) Other persons with an interest in the proceedings and who may be affected by a decision of the board in a specific case or cases may be admitted to the proceedings and be seated as determined by the board.
9. *Right of Confrontation.* A party or parties before the board is(are) entitled to confront and ask questions of any person(s), including those specified in N(1) and N(2), qualified to be designated as material witnesses and who, for such purpose, are so designated P(8)(a).
 10. *Self Incrimination.* Anyone who appears before the board enjoys a right to avoid self incrimination.
 11. *Judgment.* In reaching its decision the board shall consider only those documents submitted into evidence and the testimony of witnesses given at the hearing.
 12. *Notification of Judgment.* In cases coming before the Residential Judicial Board, the Chairman of the Board shall promptly communicate orally the board's decision to the parties involved.
 13. *Written Decision.* Within seven (7) class days, the Chairman or his/her designee will transmit to the parties and to the Dean for Residential Life a written decision. It will contain a brief statement of the facts of the case, the board's jurisdictional basis, the judgment, and the reason(s) therefore. The Dean's copy will be retained in a permanent file.
- Q. Decisions of the Residential Judicial Board are final unless appealed to the Dean for Residential Life in writing within nine (9) class days of the written decision. Grounds for appeal are limited to:
1. procedural error substantially affecting the rights of the parties involved.
 2. verdict not supported by the weight of the evidence.
 3. excessive penalty not in accord with "current University community standards."
 4. new evidence of a character directly affecting the verdict, but on which the original tribunal had refused a new hearing.
 5. error in applying or interpreting the rule under which the case was originally tried.

R. *Administrative Hearing Option.*

1. With the concurrence of all parties involved, a case may be initially presented to the Dean for Residential Life who may, in his/her discretion, hear it. Or that Dean may refuse to hear it and either refer the case to another Dean or remand the case to the Residential Judicial Board in accordance with N(1).
2. If the Dean decides to hear the case he/she is bound by the same procedures which bind the Residential Judicial Board except in procedures involving majority decisions. These decisions will be made by the Dean using his/her discretion.
3. The Dean shall have the authority to give any of the penalties specified by the code.
4. The Dean may not be subjected to a challenge, as otherwise authorized by Section P(6) above.

S. *Amendment.*

1. Amendment of the organization, jurisdiction, procedures, and sanctions in the residential judicial system may be recommended to the Vice-President for Student Affairs of the University at any time by the duly constituted Advisory Committee on Judicial Codes.
2. Such recommendation may be further considered by and subsequently promulgated by the Vice-President for Student Affairs and shall be effective from and after the date of promulgation.

Appendix E

PICKETS, PROTESTS, AND DEMONSTRATIONS

Statement of Policy. Duke University respects the right of all members of the academic community to explore and to discuss questions which interest them, to express opinions publicly and privately, and to join together to demonstrate their concern by orderly means. It is the policy of the University to protect the right of voluntary assembly, to make its facilities available for peaceful assembly, to welcome guest speakers, to protect the exercise of these rights from disruption or interference.

The University also respects the right of each member of the academic community to be free from coercion and harassment. It recognizes that academic freedom is no less dependent on ordered liberty than any other freedom, and it understands that the harassment of others is especially reprehensible in a community of scholars. The substitution of noise for speech and force for reason is a rejection and not an application of academic freedom. A determination to discourage conduct which is disruptive and disorderly does not threaten academic freedom; it is rather, a necessary condition of its very existence. Therefore, Duke University will not allow disruptive or disorderly conduct on its premises to interrupt its proper operation. Persons engaging in disruptive action or disorderly conduct shall be subject to disciplinary action, including expulsion or separation, and also charges of violations of law.

Rule. Disruptive picketing, protesting, or demonstrating on Duke University property or at any place in use for an authorized University purpose is prohibited.

Hearing and Appeal. Cases arising out of violations of the Pickets and Protests Regulations will be heard by the University Judicial Board, in accordance with the procedures outlined in Appendix C, pages 82-85. The University Judicial Board shall have jurisdiction over members of the student body, members of the faculty, and administrative personnel of the University not subject to the Personnel Policy Handbook. Hearings will

be conducted with regard for academic due process. The decision of the University Judicial Board shall be final if the accused is exonerated or if there is no appeal. In other cases, students may appeal to the President, or, in his/her absence, the Provost, in which case such appeal shall be solely on the record of the proceedings before the Hearing Committee of the University Judicial Board. Argument on appeal shall be on written submission, but the President may, in addition, require oral argument.

A Hearing Committee will consist of two faculty members, one dean, and two students. These students will be selected from members of the judicial boards or governments in the undergraduate, graduate, or professional colleges or schools. The Chairman of the Hearing Committee will be designated by its members.

The Hearing Committee will conduct its proceedings in accordance with academic due process.

The decision of the Hearing Committee shall be final if the accused is exonerated or if there is no appeal. In other cases appeal may be taken to the President, in which case such appeal shall be solely on the record of the proceedings before the Hearing Committee. Argument on appeal shall be written submission, but the President may in addition require oral argument.

The procedures for faculty members will follow the arrangements provided under the *Personnel Handbook*.

Amendments. These regulations on pickets, protests, and demonstrations may be changed or amended by the University at any time but any such change or amendment shall be effective only after due notice or publication. These regulations supersede any regulations heretofore issued on the subject.

Appendix F

RULES GOVERNING DRUG VIOLATIONS

I. Rules governing drug violations at Duke University are as follows.

1. Alleged violations of the policy stated in the first paragraph of the drug policy on page 52 will be adjudicated by the Undergraduate Judicial Board or appropriate deans, or in the case of nonstudents, by comparable authorities and their appointed delegates. It is expected that professional judgment will be exercised in referring indicated cases to University health and counseling services in keeping with the second and third paragraphs of the policy on page 52.
2. The two grounds which may constitute occasion for the assessment of penalties are:
 - a. conviction of a member of the University on a drug charge by a court of law.
 - b. a finding with the appropriate University tribunal, in conformity with the principle of due process, of sufficient evidence that a member of the University has violated the drug policy.
3. The maximum penalty to be imposed within the University upon a student for possession or use of marijuana shall be suspension; for the possession or use of other illegal drugs, or the distribution of any illegal drug, the maximum penalty of the University is expulsion. Other members of the University shall be liable to appropriate comparable penalties.

II. Rules governing drug violations of student athletes at Duke University are as follows.

Duke University prohibits drug use by its student athletes. Prohibited drugs will include anabolic steroids and other performance-enhancing drugs, narcotics and other illegal drugs, and any other drug banned by the National Collegiate Athletic Association (NCAA) legislation. The NCAA requires every student athlete to consent to be tested for prohibited drug usage. But, unlike some other institutions, Duke University will not impose drug testing on all student athletes. To do so would unfairly single out a group of students who are no more likely to use drugs than any other group of students and could contribute to the perpetuation of unfortunate and inaccurate stereotypes. Duke University will not require any student athlete to submit to testing except (i) in compliance with NCAA regulations for NCAA championships and postseason football contests; or (ii) where a coach or the Director of Intercollegiate Athletics has a reasonable and articulable suspicion that the student athlete has used a prohibited drug. In the event that a coach or the athletic director has a reasonable and articulable suspicion that a student athlete has used a prohibited drug and requests that the student athlete submit to testing, the student athlete who refuses to undertake the test, or tests positively for a prohibited drug, may be denied permission by his or her coach to represent the University in intercollegiate events or participate in team practices. The student athlete also may be subject to additional sanctions, including loss of athletically-related financial aid for subsequent semesters. Any student athlete dissatisfied with a determination to reduce or cancel his or her financial aid will have an opportunity to appear at a hearing before and appeal such a determination to the Academic Committee of the Athletic Council.

Testing will be performed in the University's Medical Center Laboratories. A positive test will be repeated to ensure accuracy where it is practicable to do so.

Duke University is committed to a policy of helping any student athlete who recognizes that he or she has a drug problem and asks for help. The first time a student athlete voluntarily seeks help for a drug problem, the appropriate official in the athletic department will provide confidential counseling or other assistance required by the student athlete, including medical and drug rehabilitation assistance at the University's expense. Unless medically indicated, a first-time drug user will remain eligible to represent the University in intercollegiate events and participate in team practices. His or her coach will not be informed of the drug problem.

If drug use recurs, and a student athlete again voluntarily seeks help for a drug problem, the appropriate official in the athletic department will endeavor to assist the student athlete. The matter will be brought to the attention of the Director of Intercollegiate Athletics. The athletic director may determine in his discretion whether medical and drug rehabilitation assistance sought or needed by a repeat user should be paid for the University; whether the student athlete will remain eligible to represent the University in intercollegiate events or participate in team practices; whether the student athlete's coach will be informed of the drug problem; and whether the student athlete will be subject to additional sanctions, including loss of athletically-related financial aid for subsequent semesters.

Staff members and others employed by the athletic department who have knowledge of the use of a prohibited drug by a student athlete are under an affirmative duty to report such usage to the student athlete's coach or the athletic director.

The effective date of this policy is July 1, 1986. Each student athlete of Duke University will receive a copy of this policy annually.

Appendix G

DUKE UNIVERSITY REGULATIONS CONCERNING PAYMENTS OF ACCOUNTS

Basic University policy requires that tuition and mandatory fees be paid in full prior to the beginning of each semester whether an invoice has been received or not. As part of

the agreement of admission to Duke University, a student is also required to pay all monthly invoices for any additional charges as presented. Two tuition payment plans will offer an alternative for payment of a portion of the charges billed each year. The *Multiple Payment Plan* provides an opportunity to pay tuition, room, and board in nine (9) installments. The *Guaranteed Tuition Plan* (freshmen only) finances and guarantees the amount and rate of tuition for four (4) years through forty-four (44) equal installments (seven [7] semesters through thirty-nine [39] installments for January freshmen) financed at 9½ percent interest. If full payment or arrangement for payment through the two plans is not received, a penalty charge as described below will be assessed on the next monthly invoice and also certain restrictions as stated below will be applied.

Late Payment Penalty Charge. If the “Total Amount Due” on an invoice is not received by its due date, the next invoice will show a penalty charge of 1¼ percent per month assessed on the past due balance regardless of the number of days past due. The “Past Due Balance” is defined as the previous balance less any payments and credits received on or before the due date and also less any student loan memo credits related to the previous balance which appear on the invoice.

Restrictions. An individual will be in default of this agreement if the “Total Amount Due” on the student invoice is not paid in full by the invoice due date. An individual who is in default will not be allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or have a diploma conferred upon graduation. In addition, an individual in default may be subject to withdrawal from school.

Appendix H

STUDENT HEALTH GRIEVANCE PROCEDURE

Duke Student Health provides a patient advocacy service as part of its health education program. Students who become patients are encouraged to use this service if they have difficulty negotiating the health care system in order to receive timely and satisfactory care. A staff health educator and the Assistant Director of Student Health serve students in an advocacy role. If complaints are in need of further resolution, students can pursue a grievance procedure, designed by the Student Health Advisory Committee (SHAC) in order to facilitate satisfactory resolution of complaints regarding the services rendered.

Procedure—Phase I. Any Duke student who feels he or she has a legitimate complaint with regard to services rendered by the Student Health Program is to obtain and complete the grievance form found in the ASDU office and the Dean for Student Life’s office. This is to be returned to the Dean for Student Life within seven (7) days of the event.

One copy of the grievance form will go to the Director of Student Health and another to SHAC. After appropriate investigation, the Director of Student Health shall respond to the student in writing, with a copy of the response to SHAC. The event will be discussed by SHAC and a SHAC member will contact the student to be sure he or she is satisfied with the process and outcome. Copies of the grievance form and response will be kept on file with the Director of Student Health. Confidentiality will be maintained throughout the process, with the student’s identity being protected.

Procedure—Phase II. If the student is not satisfied with the outcome of the procedure, he or she will be asked to submit a statement explaining why.

SHAC will discuss the event and respond to the student.

Procedure—Phase III. If the student is still displeased, all of the above forms (grievance form, response, Phase II letter, SHAC response) will be sent to the Vice-President for Student Affairs, and the Chairman of the Department of Community and Family Medicine.

Telephone Numbers Frequently Used

ADMISSIONS	684-3214
ASDU	684-6403
Belvin, James—Director of Undergraduate Financial Aid	684-6225
BRYAN CENTER INFORMATION DESK	684-2323
Bryant, Martina—Assistant Dean/Social Science/Trinity College	684-2075
BURSAR	684-3531
Cahow, Clark-Registrar	684-3146
Coon, Susan-Director of the Office of Cultural Affairs	684-5578
COUNSELING AND PSYCHOLOGICAL SERVICES	684-5100
Cox, Richard-Dean/Residential Life	684-6313
CULTURAL AFFAIRS	684-5578
Dowell, Earl-Dean of the School of Engineering	684-2214
Eisenson, Howard-Director of Student Health	684-6721
Eldridge, Albert-Associate Dean/Trinity College	684-2115
EMERGENCY	911
ENGINEERING, SCHOOL OF	684-2214
FINANCIAL AID	684-6225
Friedrich, John-Chairman of Department of Health, Physical Education, and Recreation	684-2202
Griffith, William-Vice-President for Student Affairs	684-3737
HOUSING MANAGEMENT	684-5226
HEALTH, PHYSICAL EDUCATION, AND RECREATION	684-2202
INTERNATIONAL HOUSE	684-3585
Lattimore, Caroline-Dean/Minority Affairs	684-6756
Maskel, Laurence—Acting Director of Placement Services	684-3813
McDowell, Homai-Director of the Office of Student Activities	684-2163
MINISTER TO THE UNIVERSITY	684-2177
MINORITY AFFAIRS	684-6756
Moorman, Jane Clark—Director of Counseling and Psychological Services	684-5100
Nathans, Elizabeth—Assistant Dean/Freshman, Trinity College	684-6217
Nijhout, Mary—Assistant Dean/Adviser for Health Professions/ Trinity College	684-6903
PAGE BOX OFFICE	684-4059
Phelps, Jake—Director of University Union	684-2911
PLACEMENT SERVICES	684-3813
PUBLIC SAFETY	684-2444
RESIDENTIAL LIFE	684-6313
Roach, Deborah, Dean/Natural Science/Trinity College	684-6536
Shepard, Marion—Associate Dean/Engineering	684-2214
Starnes, Marian—Bursar	684-3531
STUDENT ACTIVITIES	684-2163
STUDENT AFFAIRS	684-3737
STUDENT HEALTH	684-6721
STUDENT LIFE	684-6488
Thomason, Fidelia—Director of Housing Management	684-5226
TRINITY COLLEGE	684-3465
UNION	684-2911
Wasiolek, Suzanne—Dean/Student Life	684-6488
Weller, Robert—Assistant Dean/Trinity College	684-5012
White, Richard—Dean of Trinity College and of Arts and Sciences	684-3465
Willimon, William—Minister to the University	684-2177
Wilson, Gerald—Assistant Dean/Social Sciences/Prelaw Advisor (Trinity College)	684-2865
Wittig, Ellen—Assistant Dean/Humanities, Trinity College	684-5585
EMERGENCY—911	

Index

A

Academic Concerns, Procedure for Resolution, p. 21
 Academic Integrity, p. 61
 Administration, p. 6
 Alcoholic Beverages Policy, p. 45
 Alumni Affairs, p. 18
 Annual Review of Residential Groups, p. 34

B

Benches, Policy on, p. 34
 Board Contract, Appendix C, p. 80
 Building Improvements, Policy on, p. 33

C

Calendar, p. 5
 Campus Banner Policy, p. 49
 Career Counseling (see CAPS, p. 11 and Placement Services, p. 13)
 Cultural Affairs, p. 12
 Conferences and Conventions, p. 49
 Counseling Center (see CAPS, p. 11)
 Counseling and Psychological Services (CAPS), p. 11

D

Damages, p. 31
 Deans, Academic Advising
 Trinity, p. 10
 Engineering, p. 10
 Dean of School of Engineering, p. 10
 Dean of Trinity College, p. 9
 Discrimination, p. 50, 59
 Dogs on Campus, p. 50
 Drugs, Policy on, p. 50
 Drugs, Rules Governing Violations, Appendix F, p. 108

E

Electric Games, p. 58
 Emergency Problems (Health), p. 16
 Emergency Transportation, dial 911
 Engineering School, p. 10
 Excuses from Class
 Medical, p. 17
 Personal (see academic dean)

F

Faculty Advising, p. 10
 Films, p. 54
 Fire Equipment, p. 50
 Fire Safety, p. 29
 Fireworks, Other Explosives and Weapons, p. 51
 Food, Drink, and Tobacco, Library Policy, p. 52
 Freshman Advisory Council (FAC), p. 10

H

Hazing, p. 51
 House Dues, p. 27
 Housing Deposits, Refunds, p. 29
 Housing Management Department, p. 18

I

Identification Cards, p. 51
 Insurance (Student Accident and Sickness Policy), p. 17
 International House, p. 12

J

Judicial Code, p. 42
 Judicial Board, Undergraduate, p. 42
 Appendix C, p. 82

L

Library Materials Security, p. 51
 Library Policy Concerning Food, Drink, and Tobacco in Public Areas, p. 52
 License, Residence Hall,
 Terms of, Appendix A, p. 67

M

Medical Center, p. 52
 Medical Excuses, p. 17
 Mental Health Service (see CAPS, p. 11)
 Minister to the University, p. 14
 Minority Affairs, p. 12

N

Noise Ordinance, p. 52

O

Off-campus Living, p. 29

P

Painting Policy, p. 54
 Party Promotion, p. 49
 Party and/or Event Registration, p. 45
 Payment of Accounts, Appendix G, p. 109
 Pickets, Protests, Demonstrations, Appendix E, p. 107
 Placement Services, p. 13
 Plagiarism, def. of, p. 62
 Privacy of Students' Rooms, p. 30
 Psychological Testing (see CAPS, p. 11)
 Psychiatric Services (see CAPS, p. 11)

R

Religious Life, p. 14
 Resident Advisers, p. 14
 Residential Facilities, p. 25
 Residential Group Responsibilities, p. 35
 Residential Information, p. 25
 Residential Judicial Code, Appendix D, p. 100

S

Safety, p. 57
 Segregated Facilities, Policy on, p. 54
 Sexual Harassment, Statement on, p. 22
 Sign Policy, p. 34
 Signing Out of Residence Hall, p. 26
 Student Activities Office, p. 14
 Student Affairs, p. 11
 Student Health Grievance Procedure, Appendix H, p. 110

Student Health Programs, p. 16
 Student Life, Office of, p. 16
 Student Mental Health Service (see CAPS, p. 11)
 Student Records, p. 58
 Student Services, p. 9
 Summer Storage, p. 32

T

Telephone Numbers Frequently Used, p. 111
 Traffic Regulations and Fees, p. 58
 Trinity College, p. 9

U

University Union, p. 16

V

Vending Machines, p. 58
 Vice-President for Student Affairs, p. 11
 Video Cassette Recorders, p. 58
 Visitation in Residence Halls, p. 26

bulletin of
Duke University
1988-89

Undergraduate Instruction



bulletin of
Duke University
1988-89

Undergraduate Instruction

EDITORS

Martina J. Bryant
Assistant Dean
Ellen W. Wittig
Assistant Dean

COORDINATING EDITOR

Judy Smith
SENIOR EDITORIAL ASSISTANTS
Jean Carlton
Elizabeth Matheson

PHOTOGRAPHS

Scott Taylor
Jimmy Wallace

Typesetting by Paste-Ups, Ltd., Cary, North Carolina
Printed by William Byrd Press, Richmond, Virginia

The information in the bulletin applies to the academic year 1988-89 and is accurate and current, to the best of our knowledge, as of January, 1988. The University reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced University calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, call Dolores L. Burke, Equal Opportunity Officer, (919) 684-8111. Duke University has adopted procedures for investigation and remedy of complaints involving discrimination. See the chapter "Campus Life and Activities."

The *Bulletin of Duke University*, Volume 60, includes the following titles: *The Fuqua School of Business*; *The School of Forestry and Environmental Studies*; *Marine Laboratory*; *Undergraduate Instruction*; *The Graduate School*; *The Medical Center*; *The Divinity School*; *Information for Prospective Students*; *The Graduate School* (short form); *The School of Law*; and *Information and Regulations*.

Contents

University Calendar	6
University Administration	8
General Information	10
Degree Programs	18
Trinity College of Arts and Sciences	19
School of Engineering	34
Academic Procedures and Information	44
Advanced Placement	45
Transfer of Work Elsewhere	47
Advising	48
Registration	48
Course Load and Eligibility for Courses	50
Course Audit	50
Independent Study	51
House Courses	51
Submission of Term Paper	51
Declaration of Major or Division (TCAS)	51
Changes in Status	53
Class Attendance, Excused Absences, and Tests	54
Incomplete Course Work	55
Final Examinations and Excused Absences	55
Grading and Grade Requirements	55
Academic Recognition and Honors	56
Notification of Intention to Graduate	58
Commencement	58
Prizes and Awards	58
Education Records	61
Special Study Centers, Programs, and Opportunities	62
Campus Centers and Institutes	63
Center for International Studies	63
Center for Research on Women	65
Continuing Education	65
Institute of the Arts	66
Institute of Statistics and Decision Sciences	66
Programs Not Offering Majors	66
Film and Video	66
Human Development	66
Judaic Studies	67
Neurosciences	67
Perspectives on Marxism and Society	67
Primatology	68
Science, Technology, and Human Values	68
Twentieth-Century American Program	68
Women's Studies	68
Reserve Officer Training Corps	69
Off-Campus Opportunities	70
Study Abroad	70
Duke University Marine Laboratory	75
Agreements with Other Universities	75
Duke Futures Programs	76
Special Summer Programs	76
Duke Summer Festival of Creative Arts	76
Precollege Program	76

Campus Life and Activities	78
Student Affairs	79
Residential Life	79
Dining Facilities	80
Religious Life	80
Services Available	81
Offices for Program Planning	83
Student Organizations	85
Health, Physical Education, and Recreation	86
Intercollegiate Athletics	87
The Duke Student Honor Commitment	87
Judicial System and Regulations	88
Student Discrimination Grievance Procedures	88
Student Obligations and Requirements	88
Admission	90
Requirements for Application	91
Application Procedures	92
Financial Information	94
Tuition and Fees	95
Living Expenses	99
Fall and Spring Refunds	100
Summer Withdrawal Charges and Refunds	100
Student Aid	106
Courses of Instruction	107
Trinity College of Arts and Sciences	107
Aerospace Studies—Air Force ROTC	107
Afro-American Studies	108
Anthropology	109
Art and Art History	116
Institute of the Arts	123
Asian and African Languages and Literature	127
Biology	130
Botany	131
Canadian Studies	136
Chemistry	138
Classical Studies	141
Comparative Area Studies	147
Comparative Literature	155
Computer Science	158
Distinguished Professor Courses	163
Drama	164
Economics	168
Education	174
English	176
Film and Video	184
Forestry and Environmental Studies (School)	185
The University Program in Genetics	186
Geology	187
Germanic Languages and Literature	191
Health, Physical Education, and Recreation	194
History	197
Human Development	207
Interdisciplinary Courses	208
Judaic Studies	211
Linguistics	212
Management Sciences (Fuqua School)	213
The University Program in Marine Sciences	214
Mathematics	216
Medicine (School)	223
Medieval and Renaissance Studies	225
Military Science—Army ROTC	227

Music	229
Naval Science—Navy ROTC	235
Neurosciences	237
Philosophy	238
Physics	242
Political Science	245
Psychology	257
Public Policy Studies	264
Religion	269
Romance Languages	276
Science, Technology, and Human Values	285
Slavic Languages and Literatures	285
Sociology	288
Institute of Statistics and Decision Sciences	295
University Writing Program	296
Women's Studies	296
Zoology	299
The School of Engineering	304
Interdepartmental	304
Biomedical	306
Civil and Environmental	309
Electrical	316
Mechanical Engineering and Materials Science	322
Index	328



University Calendar—1988-89

Summer 1988*

March		
28	Monday	Beginning of registration for Term I and/or Term II
May		
3	Tuesday	Beginning this day, summer Drop/Adds must be approved by the academic dean or director of graduate studies
4	Wednesday	Last day for registration and payment of Term I fees without \$25 late fee (before 4:30 P.M.)
12	Thursday	Term I classes begin
16	Monday	Drop/Add for Term I ends at 4:00 P.M.
June		
20	Monday	Last day for registration and payment of Term II fees without \$25 late fee (before 4:30 P.M.)
24	Friday	Term I final examinations begin
25	Saturday	Term I final examinations end
28	Tuesday	Term II classes begin
30	Thursday	Drop/Add for Term II ends at 4:00 P.M.
August		
10	Wednesday	Term II final examinations begin
11	Thursday	Term II final examinations end

Fall 1988

August		
24	Wednesday	Orientation begins; assemblies for all new undergraduate students
29	Monday, 8:00 A.M.	Fall semester classes begin
30	Tuesday, 4:00-6:00 P.M.	Drop/Add begins, Intramural Building
31	Wednesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.	Drop/Add continues, 103 Allen Building
September		
1-2	Thursday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.	Drop/Add continues, 103 Allen Building
5	Monday	Labor Day, classes in session
6-9	Tuesday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.	Drop/Add continues, 103 Allen Building
October		
14	Friday	Last day for reporting midsemester grades
14	Friday, 6:00 P.M.	Fall break begins
19	Wednesday, 8:00 A.M.	Classes resume
21-23	Friday-Sunday	Homecoming
November		
4-6	Friday-Sunday	Parents' Weekend
7-10	Monday-Thursday	Registration for spring semester, 1989
23	Wednesday, 12:30 P.M.	Thanksgiving recess begins
28	Monday, 8:00 A.M.	Classes resume
December		
8	Thursday, 6:00 P.M.	Fall semester classes end
9-11	Friday-Sunday	Reading period
11	Sunday	Founders' Day
12	Monday	Final examinations begin
17	Saturday	Final examinations end

*The School of Forestry, the Fuqua School of Business, the Marine Laboratory, the Graduate Nursing Program, and Physical Therapy may have different starting dates during the summer; consult the appropriate bulletins and schedules.

Spring 1989

January

- 9 Monday—Orientation begins
- 11 Wednesday—Registration and matriculation of new undergraduate students
- 12 Thursday, 9:00 A.M.—Spring semester classes begin
- 13 Friday, 4:00-6:00 P.M.—Drop/Add begins, Intramural Building
- 16-20 Monday-Friday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.—Drop/Add continues, 103 Allen Building
- 23-25 Monday-Wednesday, 8:30 A.M.-12:30 P.M. and 2:00-4:00 P.M.— Drop/Add continues, 103 Allen Building

February

- 24 Friday—Last day for reporting midsemester grades

March

- 10 Friday, 6:00 P.M.—Spring recess begins
- 20 Monday, 8:00 A.M.—Classes resume

April

- 3-5 Monday-Wednesday—Registration for fall semester, 1989 and beginning of registration for summer, 1989
- 26 Wednesday, 6:00 P.M.—Spring semester classes end
- 27-30 Thursday-Sunday—Reading period

May

- 1 Monday—Final examinations begin
- 6 Saturday—Final examinations end
- 12 Friday—Commencement begins
- 14 Sunday—Graduation exercises. Conferring of degrees



University Administration

GENERAL ADMINISTRATION

H. Keith H. Brodie, M.D., LL.D., *President*
Phillip A. Griffiths, Ph.D., *Provost*
Eugene J. McDonald, LL.M., *Executive Vice-President*
William G. Anlyan, M.D., D.Sc., *Chancellor*
Joel L. Fleishman, LL.M., *Vice-President*
J. Peyton Fuller, A.B., *Vice-President, Planning and Treasurer*
William J. Griffith, A.B., *Vice-President for Student Affairs*
John J. Piva, Jr., B.A., *Vice-President for Alumni Affairs and Development*
Patricia C. Skarulis, M.A., *Vice-President for Information Systems*
Andrew G. Wallace, M.D., *Vice-President for Health Affairs*
John F. Adcock, M.B.A., *Corporate Controller*
N. Allison Haltom, A.B., *Secretary of the University*

GENERAL ACADEMIC ADMINISTRATION

Phillip A. Griffiths, Ph.D., *Provost*
S. Malcolm Gillis, Ph.D., *Vice-Provost for Academic Affairs and Dean of the Graduate School*
Charles E. Putman, M.D., *Vice-Provost for Research and Development*
Thomas A. Langford, Ph.D., *Vice-Provost for Special Projects*
Margaret Bates, Ph.D., *Vice-Provost for Academic Programs and Facilities*
Paula Burger, Ph.D., *Vice-Provost for Academic Services*
Judith Ruderman, Ph.D., *Director of Continuing Education*
Calvin Ward, Ph.D., *Assistant Provost for Academic Facilities and Director of the Summer Session*
Clark R. Cahow, Ph.D., *Assistant Provost and University Registrar*
Melissa Mills, M.B.A., *Assistant Provost*
Susan MacDonald, M.A., *Assistant Provost*

Trinity College, Arts and Sciences

Richard A. White, Ph.D., *Dean*
Albert F. Eldridge, Ph.D., *Associate Dean*
Martina J. Bryant, Ed.D., *Assistant Dean*
Caroline L. Lattimore, Ph.D., *Assistant Dean*
Elizabeth S. Nathans, Ph.D., *Assistant Dean and Director of the Premajor Advising Center*
Mary Nijhout, Ph.D., *Assistant Dean and Director of Health Professions Advising Center*
Deborah A. Roach, Ph.D., *Assistant Dean*
Robert P. Weller, Ph.D., *Assistant Dean*
Gerald L. Wilson, B.D., Ph.D., *Assistant Dean*
Ellen W. Wittig, Ph.D., *Assistant Dean*
Charles W. Byrd, Jr., Ph.D., *Assistant Dean for Academic Affairs*
Thomas D. Mann, A.B., *Assistant Dean for Administration*
Lee W. Willard, Ph.D., *Assistant Dean for Planning and Development*

School of Engineering

Earl H. Dowell, Sc.D., *Dean*
Jack B. Chaddock, Sc.D., *Associate Dean for Research and Development*
Marion L. Shepard, Ph.D., *Associate Dean for Academic Affairs*

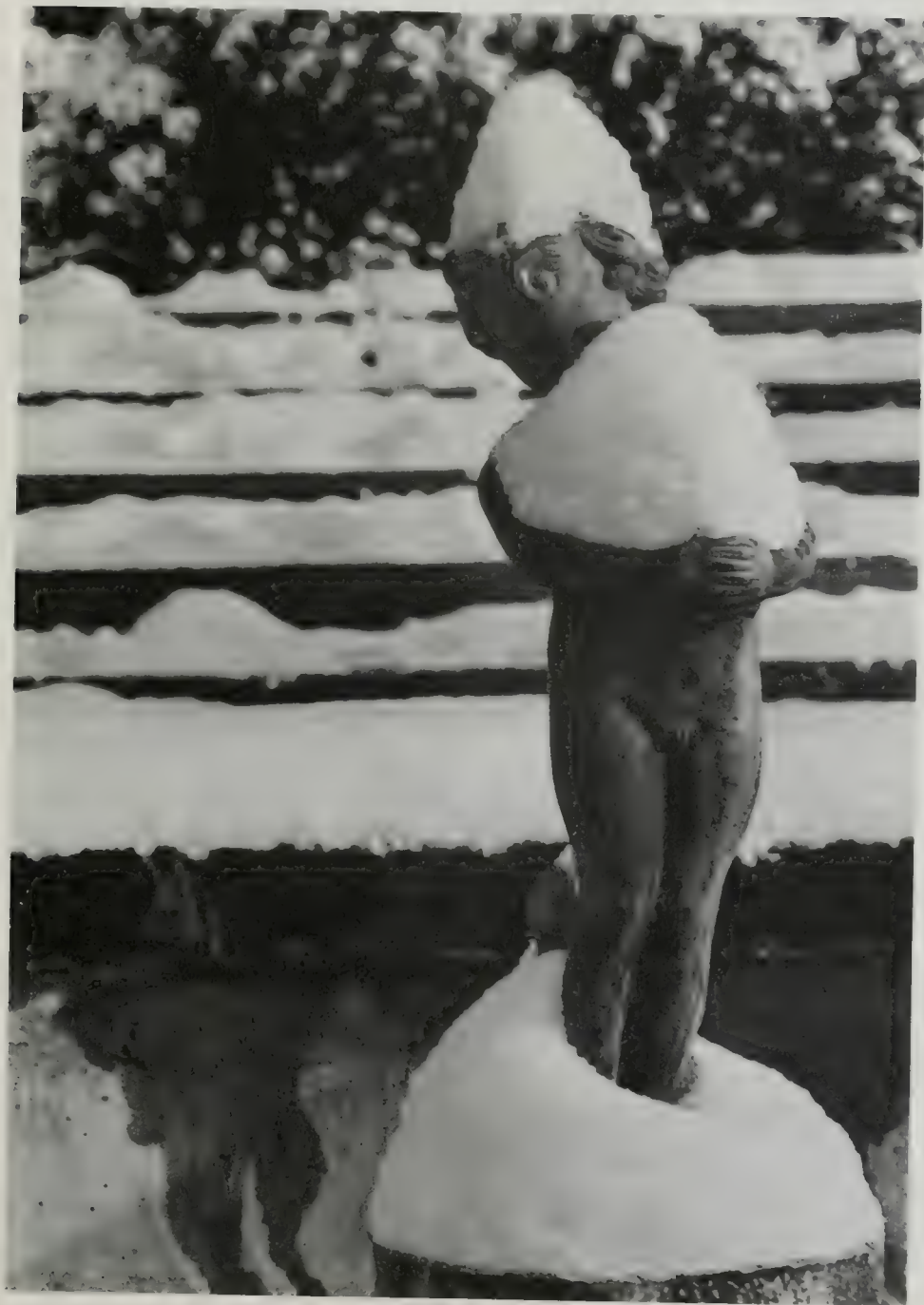
Student Affairs

William H. Willimon, M.Div., STD, *Minister to the University*
Nancy Ferree-Clark, M.Div., *Associate Minister to the University*
Jane Clark Moorman, M.S.W., ACSW, *Director, Counseling and Psychological Services*
Susan L. Coon, M.A., *Director, Office of Cultural Affairs*
Carlisle C. Harvard, B.A., *Director, International House*
Caroline L. Lattimore, Ph.D., *Dean for Minority Affairs*
Edward S. Hill, Ph.D., *Director, Mary Lou Williams Center for Black Culture*
Laurence P. Maskel, Ph.D., *Acting Director, Placement Services*
Richard L. Cox, B.D., Ed.D., *Dean for Residential Life*
Ella E. Shore, M.A., *Associate Dean for Residential Life*
Homai McDowell, D.B.A., *Director, Office of Student Activities*
Howard J. Eisensohn, M.D., *Director of Student Health*

Suzanne Wasiolek, M.H.A., *Dean for Student Life*
Jake Phelps, B.A., *Director, University Union*
Peter J. Coyle, Jr., B.A., *Associate Director, University Union*

Admissions and Financial Aid

Richard Steele, Ph.D., *Director of Undergraduate Admissions*
James A. Belvin, Jr., B.S., *Director of Undergraduate Financial Aid*



General Information



Duke University

In 1839 a group of citizens from Randolph and adjacent counties in North Carolina assembled in a log schoolhouse to organize support for a local academy founded a few months earlier by Brantley York. Prompted, they said, by “no small share of philanthropy and patriotism,” they espoused their belief that “ignorance and error are the banes not only of religious but also civil society which rear up an almost impregnable wall between man and happiness.” The Union Institute, which they then founded, was reorganized in 1851 as Normal College to train teachers, and again in 1859 as Trinity College, a liberal arts college, which later moved from the fields of Randolph County to the growing city of Durham, North Carolina. Trinity College was selected by James B. Duke as the major recipient of a fortune when, in 1924, he provided endowment funds for the university that would be organized around Trinity College and named for the Duke family.

The old Trinity College had, like almost all institutions in America at the time it was founded, been restricted to men. In 1896, Washington Duke gave an endowment with the condition that women be admitted “on equal footing with men.” Thereafter, women were educated in Trinity College, and in 1930 the Woman’s College was established as a separate college. Trinity College and the Woman’s College continued as coordinate colleges for over forty years. To assure that women were indeed admitted “on equal footing with men,” and to recognize that the education which men and women had received at Duke had long taken place in the same classrooms, the University merged these coordinate colleges in 1972 to form Trinity College of Arts and Sciences, the liberal arts undergraduate college of the University. The Bachelor of Arts and Bachelor of Science degrees may be earned in the college.

Instruction in engineering started at Normal College in 1851 and was continued at Trinity College as an option in the arts and sciences program. A Department of Engineering was established at Trinity in 1910. Following the establishment of Duke University in 1924, the Departments of Civil and Electrical Engineering were formed in 1927, and a Department of Mechanical Engineering was added four years later. The three engineering departments were joined to form the Division of Engineering as a separate administrative unit of the University. In 1939 this division was renamed the College of Engineering, which in 1966 became a professional school of engineering. The Division of Biomedical Engineering was added to the School of Engineering in 1967, and it was recognized as a department in 1971. In 1974 the name of the mechanical engineering department was changed to the Department of Mechanical Engineering and Materials Science; in 1982, the Department of Civil Engineering was renamed the Department of

Civil and Environmental Engineering. All four departments offer courses leading to Bachelor of Science in Engineering, Master of Science, and Doctor of Philosophy degrees.

The School of Nursing was established in 1931 in association with the School of Medicine and Duke Hospital. From 1944 until 1957, the Bachelor of Science in Nursing Education degree was offered in cooperation with the Department of Education. A four-year program leading to the degree of Bachelor of Science in Nursing was approved by the University Board of Trustees in 1953, and in 1958 a graduate program was initiated. In 1980 the University Board of Trustees approved the phaseout of the existing undergraduate degree programs. At present, the School of Nursing offers courses leading to the Master of Science in Nursing degree. The Dean of the School of Nursing reports to the Executive Vice-President and Chancellor for Health Affairs.

As the University developed around the core of undergraduate colleges and schools, the Graduate School expanded in areas of instruction and research. The School of Law of Trinity College became the Duke University School of Law, and other professional schools were established. The Divinity School was organized in 1926, the School of Medicine in 1930, the School of Forestry in 1938, and the Graduate School of Business Administration in 1969. In 1974, the School of Forestry was renamed the School of Forestry and Environmental Studies; in 1980 the business school became the Fuqua School of Business. The Graduate School itself, as distinguished from these professional schools, was organized in the 1920s. It now consists of some fifty-five departments and programs, and offers A.M., M.S., M.H.A., and Ph.D. degrees.

Duke, a privately supported, church-related (Methodist) university, has over 9,000 students enrolled in degree programs. These students represent nearly every state and many foreign countries; Duke has more than 60,000 alumni in all fifty states and in many foreign countries. The University is a member of the North Carolina Association of Independent Colleges and Universities, the Southern Association of Colleges and Schools, and the Association of American Universities.

From academy to university, some of the basic principles have remained constant. The Duke University motto, *Eruditio et Religio*, reflects a fundamental faith in the union of knowledge and religion, the advancement of learning, the defense of scholarship, the love of freedom and truth, a spirit of tolerance, and a rendering of the greatest service to the individual, the state, the nation, and the church. Through changing generations of students, the objective has been to encourage individuals to achieve, to the extent of their capacities, an understanding and appreciation of the world in which they live, their relationship to it, their opportunities, and their responsibilities.

Resources of the University

The Faculty. The University faculty, approximately 1,500 along with 1,700 adjunct and clinical faculty, maintains a tradition of personal attention to students and devotion to research. Many members of the faculty are, and have been, cited for excellence in teaching and are elected to membership in the national societies which honor those best in scholarship and research. Leaders in their disciplines and their professional organizations, they are authors of significant books and articles. Members of the faculty also act as consultants to industry, government, and foundations. To honor its outstanding faculty, the University has established more than seventy James B. Duke and other named professorships.

The Library System. The libraries of the University consist of the William R. Perkins Library and its seven branches on campus: Biology-Forestry, Chemistry, Divinity, East Campus, Engineering, Music, Mathematics-Physics; the Pearse Memorial Library at the Duke Marine Laboratory in Beaufort; and the independently administered libraries of Law, Medicine, and Business (Fuqua). In June 1987, these libraries contained approxi-

mately 3,627,000 volumes. More than 10,000 periodicals, 14,000 serials, and 200 newspapers are received regularly. The collection includes about 7,500,000 manuscripts, 90,000 maps, 42,500 music scores, 575,000 microforms, and over 1,000,000 public documents.

The William R. Perkins Library. The William R. Perkins Library, the main library of the University, houses most of the books and journals in the humanities and social sciences, large files of United States federal and state documents, public documents of many European and Latin American countries, publications of European academies and learned societies, and special collections from South Asian, Far Eastern, and Slavic countries. The newspaper collection, with nearly 530,000 microform pieces, has several long eighteenth-century files; strong holdings of nineteenth-century New England papers; and antebellum and Civil War papers from North Carolina, South Carolina, Virginia, and Georgia; as well as many European and Latin American papers. The manuscript collection of approximately seven and a half million items is particularly strong in all phases of the history, politics, and social and economic life of the South Atlantic region; it also includes significant papers in English and American literature. The rare books collection contains many scarce and valuable materials covering a broad range of fields, and the Latin and Greek manuscripts constitute one of the outstanding collections of its kind in the United States. The collection of Confederate imprints is one of the largest in the country.

The Undergraduate Library houses the required reading materials placed on reserve for most graduate and undergraduate courses as well as the library's audiovisual collection of films, audio and disk recordings, and videocassettes. The branch libraries serve the academic disciplines whose names they bear. The East Campus Library is primarily for undergraduate use, but it also contains the principal collections for graduate and undergraduate study in art and the performing arts.

Reference librarians are on duty in Perkins Library for most of the hours the library is open. Their primary responsibility is to assist patrons in making the most effective use of library collections and facilities. In addition to answering specific questions, the reference librarians also help patrons access information by identifying and explaining the use of library sources and by giving formal and informal library instruction to groups of students, faculty, or staff. Professional reference service is available to students in all other campus libraries.

Tours of the Perkins Library are given frequently during Orientation Week and upon request throughout the year. Information about other campus libraries may be obtained from the staff in each of the libraries. Handbooks about library services and facilities are also available in each of the libraries.

To protect the collections of Perkins Library for the benefit of all members of the University community, electronic security systems are in operation at the main exit and at the periodicals exit. Desk attendants are authorized to examine all books and other library materials that people using the library may be carrying in hands, briefcases, or bags to determine if they are properly charged. Anyone who refuses to permit books to be examined may be denied further use of the library.

The library has microfilming and copying services. The rules with regard to copyright and a schedule of fees for reproduction services are available in the library at the point of service.

The Medical Center Library. The Medical Center Library, located in the Seeley G. Mudd Communications Center and Library Building, provides the services and collections necessary to further educational, research, and clinical activities in the medical field. Services are available to the students, faculty, and staff of the School of Medicine; of the Division of Allied Health; of Duke Hospital; and of the graduate departments in the basic medical sciences. Other students and faculty needing access to biomedical literature may apply for privileges upon application to the Head of the Circulation Department.

Over 225,000 volumes are available, including the Trent Collection in the History of Medicine. Approximately 2,650 journal subscriptions are received currently, in addition to extensive back files of older materials. The library has several types of audiovisual materials and equipment. With the exception of certain items shelved on reserve, these materials have been integrated into the general book and journal collections and are listed in the card or journal catalogs. The Frank Engel Memorial Collection consists of a small group of books on nonmedical subjects for general reading, together with several newspapers and popular magazines. Traditional reference services are supplemented by on-line bibliographic systems and computer-produced specialized indexes.

The uniform borrowing privileges apply to all registered users. Details of loan and other services may be found in the guide which is published each year and is available at the library.

The School of Law Library. The School of Law Library, with over 370,000 volumes, serves both the University and the local legal community. It features comprehensive coverage of basic Anglo-American primary source materials, including nearly all reported decisions of federal and state courts, as well as current and retrospective collections of federal and state codes and session laws. Digests, legal encyclopedias, and other indexing devices provide access to the primary documents. A large section of the library collection is devoted to treatises on all phases of law and legal sciences, as well as history, economics, government, and other social and behavioral sciences relevant to legal research. The treatises are organized in the Library of Congress classification system and most are accessible through the Duke University online catalog. Special treatise collections are maintained in several subject areas, including the George C. Christie collection in jurisprudence and the Floyd S. Riddick collection of autographed senatorial material. The library is a selective depository for United States government publications, with concentration on congressional and administrative law materials. The library receives the records and briefs from the United States Supreme Court, the Fourth Circuit Court of Appeals, and the North Carolina Supreme Court and Court of Appeals. In addition to its Anglo-American holdings, the library holds substantial research collections in foreign and international law. The foreign law collection is extensive in coverage, with concentrations in European law and business law materials. The international law collection is strong in primary source and treatise material on both private and public international law topics. Undergraduate and graduate students whose course of study requires access to legal literature may use the library. However, access to the library may be restricted during certain times because of accreditation standards.

Record Library. The Department of Music has a record library separate from the university libraries with facilities for listening to records and tapes. All materials may be used in the listening room and any member of the community may borrow from the Arts Council Collection of more than 2,700 records for a nominal fee.

University Archives. The Duke University Archives, the official archival agency of the University, collects, preserves, and administers the records of the University having continuing administrative or historical value. The institutional archives, which also include published material, photographs, papers of student groups and faculty, and selected memorabilia, are available for research under controlled conditions in 341 Perkins Library.

Computation Center. Extensive computer resources are essential for a contemporary university. Computing is provided at Duke by the Duke University Computation Center (DUCC). The center presently maintains an IBM 3083 System Complex with sixteen megabytes of memory, eight IBM 3380 disk drives, eight IBM 3350 disk drives, eight IBM 3330-11 disk drives, six IBM 3420 tape drives, three IBM high-speed printers, one Xerox 8700 laser printer, a Cal-Comp digital plotter, and an IBM 2540 card reader/punch. The DUCC facility is connected by a high-speed microwave link to the Triangle Universities Computation Center (TUCC) located in the Research Triangle Park.

TUCC is a regional computer network formed and operated jointly by Duke University, North Carolina State University at Raleigh, and the University of North Carolina at Chapel Hill. The computer equipment at TUCC consists of one IBM 3081 with thirty-two million bytes of memory, multiple 3330- and 3350-type disk facilities, thirteen tape drives, card readers, and printers.

The IBM 3083 at DUCC is used mostly for administrative computing and as a high-speed link to TUCC. TUCC is used for academic research and instructional computing. Also connected to TUCC are four medium-speed printers located in the Engineering Building, the Biological Sciences Building, the Sociology-Psychology Building, and the West Duke Building on East Campus, as well as seven low-speed interactive terminal clusters located at various points on campus. Seven clusters and two large laboratories of IBM Personal Computers are available at various locations around campus. The laboratories are housed in the Engineering Building and in North Building. Also available are several APPLE MacIntosh microcomputer clusters.

Funds for using TUCC may come from outside grants or contracts or from University funds. Several schools within the University such as Arts and Sciences and Engineering may apply for funding specifically earmarked for use at TUCC. Faculty within these schools are automatically given a TUCC account code. Graduate students in these schools may apply for a TUCC account code. Additional funds are normally available through departments. More specific information regarding Duke computing facilities may be obtained from the Director of the Computation Center or the Director of Academic Computing.

Science Laboratories. In addition to the teaching and research laboratories in the departments of natural and social sciences and in the School of Engineering, there are other facilities in which some advanced undergraduates work on individual projects. These include the Duke University Marine Laboratory in Beaufort, North Carolina; the phytotron of the Southeastern Plant Environment Laboratories, located on the Duke campus; the Duke Forest, adjacent to the campus; the Duke University Primate Center in Duke Forest; and the Triangle Universities Nuclear Laboratory, also on the campus.

Duke as a Residential University

Duke has a long tradition as a residential university and has sought to provide for the great majority of the undergraduates convenient on-campus housing in both residence halls and apartments. While the University was established to provide a formal educational opportunity for students, Duke has always taken the position that education encompasses social and personal development as well as intellectual growth. In order to facilitate such a holistic approach, Duke seeks to provide a supportive environment substantially anchored in its residential program.

Educational, cultural, and outdoor adventure programming is planned and presented throughout the year for living groups through the cooperative work of the Office of Residential Life, Trinity College of Arts and Sciences, the School of Engineering, and resident students. There are a number of faculty members in residence in both freshman and upperclass houses. Faculty offices and seminar rooms are also located in several houses. The goals of these various programs are to enhance the quality of intellectual and social life for the residents on campus, to facilitate student-faculty interaction outside of the formal classroom, and to develop a greater sense of community within the individual residence halls as well as within the greater University.

The Undergraduate College and School

In Trinity College of Arts and Sciences and the School of Engineering, instruction is offered by University faculty who engage in research and in graduate and undergraduate teaching. Duke offers its undergraduates the opportunity to study with many inter-

nationally recognized authorities in their disciplines and with faculty members who are jointly committed to undergraduate instruction and to the advancement of knowledge. The University recognizes that students learn not only through formal lectures, but also through the interplay of ideas among faculty members and students; thus, it offers undergraduates opportunities to test their ideas against those of their professors and to observe at close range those who have committed their lives to academic careers.

The University, if it is doing its job properly, is educating citizens of the United States and of the world, not only individuals aspiring to personal fulfillment. At Duke, the men and women who earn degrees are likely to become leaders in industry, government, and the professions. They will have influence on and will be influenced by the social fabric of which they are a part. The kind of people they become will matter not only to them and their families, but also to their communities, to the United States, and to the countries of the rest of the world as well.

Amidst changing external conditions, the University cannot be sure of what knowledge and what talents will best prepare the citizens of the future for the general welfare. The chances are that the currently most lucrative professions will not remain so as new combinations of knowledge and skill become more useful to the polity which supports us all.

Trinity College of Arts and Sciences. In Trinity College, the liberal arts are a means through which students explore the world of ideas from art and music to neurosciences and physics. The undergraduate program, rated one of the finest in the country, helps students learn how to deal successfully with the challenges, intellectual and philosophical, that modern life provides. Trinity College is a community of outstanding students and talented, nationally-ranked faculty. As members of this community, students learn to ask questions, analyze rationally, challenge ideas, and contribute to the continuing development of knowledge.

The Trinity experience offers a traditional liberal arts base of study and currently requires, within broad limits, exposure to great ideas in the three major areas of intellectual activity: the humanities, social sciences, and natural sciences. It offers exposure across a broad spectrum as well, and interdisciplinary and interdepartmental programs stretch horizons even further. Internships and apprenticeships in areas related to students' majors are increasingly available so that practical experience can complement a more formal education. In a world where people are drawn ever closer together, the understanding of cultural difference and diversity becomes increasingly important. Our study abroad programs are varied and plentiful.

The undergraduate college of arts and sciences is unique in that it is set within a distinguished research university. We believe that this combination provides unparalleled opportunities for interaction with faculty, both inside and outside the classroom. The arts and sciences faculty boasts some of the most highly rated scholar-teachers in the country. They challenge students both to master and to reach beyond the basics of fundamental knowledge. At Duke there is a genuine concern for learning, and students are prepared by academic challenges and their individual experiences for the critical decision-making required of them for participatory citizenship, full personal lives, and successful careers.

School of Engineering. The undergraduate engineering program at Duke University is designed both for students who intend to become professional engineers and for those who desire a modern, general education based on the problems and the promises of a technological society. The environment in which students are educated is as important in shaping their future as their classroom experiences. In the Duke School of Engineering this environment has two major components: one is modern technology derived from the research and design activities of faculty and students in the school; the other is the liberal arts environment of the total University, with its humanitarian, social, and scientific emphases.

Engineering is not a homogeneous discipline; it requires many special talents. Some faculty members in the School of Engineering are designers; they are problem-oriented, concerned with teaching students how to solve problems—how to synthesize relevant information and ideas and apply them in a creative, feasible design. Other engineering faculty members function more typically as scientists; they are method-oriented, using the techniques of their discipline in their teaching and research to investigate various natural and artificial phenomena.

Degree Programs



Degrees and Academic Credit

Duke University offers in Trinity College of Arts and Sciences the degrees of Bachelor of Arts and Bachelor of Science, and in the School of Engineering the degree of Bachelor of Science in Engineering. Within the curriculum of each college or school, students have the major responsibility for designing and maintaining a course program appropriate to their background and goals. They are assisted by faculty advisers, departmental Directors of Undergraduate Studies, and academic deans.

Credit toward a degree is earned in units called semester courses (s.c.), commonly abbreviated as courses. These courses ordinarily consist of three to four hours of instruction each week of the fall or spring semester or the equivalent total number of hours in a summer term. Double courses, half courses, and quarter courses are also recognized.

Trinity College of Arts and Sciences

Effective for students who matriculate as degree candidates after May 1, 1988:

A variety of approaches to a liberal education is provided by Program I and II. Either program leads to the Bachelor of Arts or Bachelor of Science degree, and each requires thirty-four semester courses.

PROGRAM I

Program I provides for the experience and achievement that constitute a liberal education. The ability to organize ideas and to communicate them with clarity and precision is refined by completing the writing course and by the requirement for discussion in small groups. Knowledge of a foreign language contributes to an understanding of the nature of language itself and to perspectives on other cultures. Through courses in arts and literatures students learn about the creative products of the human intellect; courses about civilizations ask students to attend to the analysis and evaluation of ideas and events that shape civilizations past and present. Through courses in natural sciences students learn how to interpret and utilize information in an increasingly technological world, while courses in quantitative reasoning help develop skills of inference and analysis. Finally, through courses in the social sciences students learn about the causes of human behavior and about the origins and functions of the social structures in which we operate.

Students must complete the requirements listed below and explained, where necessary, on the following pages. No degree requirements, except the requirement for thirty-four course credits and continuation requirements, may be met by a course passed under a pass/fail option unless the course is offered only on that basis.

Writing. Students are required to demonstrate ability to write effective English prose by completing a course in expository writing, ordinarily University Writing Course 4, 5, 6, or 7. See the section University Writing Program in the chapter "Courses of Instruction."

General Studies consisting of courses in five of the following six areas of knowledge:

Arts and Literatures (AL)
Civilizations (CZ)
Foreign Languages (FL)
Natural Sciences (NS)
Quantitative Reasoning (QR)
Social Sciences (SS).

—In four of these areas a student must take three courses. Two of these three courses in each area must be related (see below), and at least one of the three in each area must be at the 100-level.

—In the remaining area a student must take two courses.

—Advanced placement credits will *not* substitute for courses in these areas.

The Major consists of the requirements for majors in the department or program in which a student wishes to obtain a bachelor's degree (see below). These requirements are described under the course listing for each department or program. Advanced placement courses may substitute for courses in the major as described by each department.

Elective courses. Advanced placement credits may function as elective courses. Courses that a student is using as electives may or may not carry an area of knowledge designation.

Small Group Learning Experiences.

—Before reaching junior status: at least one full course designated as a seminar, tutorial, or independent study; or a combination of two preceptorials or discussion sections.

—During the junior and senior years: at least two full courses designated as seminars, tutorials, independent study, or a thesis.

Course credits. Thirty-four (34) courses are required for graduation, not more than two with a grade of *D*, and including:

—*At least* seventeen (17) at Duke (ordinarily including the senior year).

—*At least* twenty-one (21) outside the major department.

—For the major: *no more* than seventeen (17) total for a Bachelor of Arts major and *no more* than nineteen (19) for a Bachelor of Science major.

—*At least* twelve (12) courses at or above the 100-level.

—*No more* than: one credit of physical education activity and dance activity (i.e., two half-credit activity courses), two credits for house courses (i.e., four half-credit house courses), six from a professional school (e.g., business, engineering, medicine), and four in military science.

Quality of Work. Passing grades are expected in all course work, but see pages below for minimum continuation requirements. Students accept personal responsibility for understanding and meeting the requirements of the curriculum.

Distribution of Courses. Students achieve breadth and balance of intellectual experience by taking courses in at least five of the six areas of knowledge. Courses that can be taken to satisfy the distribution requirement are identified in the *Bulletin* by a two-

letter code (AL, CZ, FL, NS, QR, SS). In four of the areas of knowledge a student must take at least three courses. At least one of the three courses must be at the 100 or 200 level and at least two of the three courses must be related (see below). In one additional area of knowledge a student is required to take at least two courses.

Related Courses. Students achieve a measure of depth in their general course of study by taking at least *two related courses* that support or complement each other in *each of four areas of knowledge*. The related course work provision stimulates students to make considered choices about their course distribution. It encourages the choice of courses that develop a special interest in depth, of courses that extend and enhance what a student has already learned, or of courses that build on each other to develop an area in greater depth than can be explored in a single semester. Related courses may be, for example, a defined two-course sequence (such as Mathematics 31, 32), a course and its prerequisite, or two courses that are used to develop topical, geographic, or temporal connections. Choices of related courses are made in consultation with a faculty advisor (see the section on Advising).

The Major. Students are expected to acquire some mastery of a particular discipline or interdisciplinary area as well as to achieve a breadth of intellectual experience. They therefore complete a departmental major, an interdisciplinary major, or an interdepartmental concentration. At least half the courses for a student's major field must be taken at Duke although departments may make exceptions to this rule in special circumstances. A student who completes requirements for two majors may have both recorded on the official record. See the chapter "Academic Procedures and Information" for the majors within each degree and for procedures on declaring a major.

Departmental Major. The courses for a departmental major may include introductory or basic prerequisite courses and higher-level courses in the major department or in the major department and related departments. The courses required in the major department must include at least five beyond the introductory or basic prerequisite level, but may not exceed eight semester course credits for the Bachelor of Arts degree or ten for the Bachelor of Science degree. Students may elect a more intensive major program, but only thirteen courses in one department count toward the graduation requirement of thirty-four semester courses. Furthermore, the total number of courses at any level in the major and in related departments may not exceed seventeen semester courses for the Bachelor of Arts degree and nineteen semester courses for the Bachelor of Science degree. Departmental majors are available in anthropology, art design, art history, botany, chemistry, classical studies, economics, English, French, geology, Germanic languages and literature, Greek, history, Latin, mathematics, music, philosophy, physics, political science, psychology, public policy studies, religion, Slavic languages and literatures, sociology, Spanish, and zoology. The courses required for a major are specified by the department. The requirements appear in the section following each department's course descriptions.

Program Major. Students may satisfy the requirement by completing work prescribed for a major in approved programs, often interdisciplinary. These programs include Afro-American studies, biology, Canadian studies, comparative area studies, comparative literature, drama, and medieval and Renaissance studies. The requirements for these majors appear under each program in the chapter "Courses of Instruction."

Interdepartmental Concentration. A student may pursue an interdepartmental major program designed by the student and advisers as an alternate means of satisfying the major requirement. An interdepartmental concentration consists of at least three courses beyond the introductory level in each of two or more departments. For procedures see the section on declaration of major or division in the chapter "Academic Procedures and Information."

Small Group Learning Experiences. By supplementing the classroom and lecture methods of instruction, small group learning experience courses assure students oppor-

tunities to engage in discussion, develop skills, refine judgment, and defend ideas when challenged. A *seminar* (ordinarily indicated by the suffix S) is an independent course of twelve to fifteen (exceptionally to twenty) students who, together with an instructor, engage in disciplined discussion. The number of meeting hours per term is the same as for regular courses of equivalent credit. Instructors are encouraged to present to each student at the end of the term a written evaluation of the student's work. A *discussion section* (D) is a group of approximately ten students and an instructor, in which discussion is the paramount characteristic; it is an integral part of a larger regular course, and every member of the class is enrolled. A *preceptorial* (P) is a group of usually no more than twelve students and an instructor in which discussion is the primary component; it is an additional and optional unit attached to a regular course involving one or more extra meetings per week. No additional course credit is given for a preceptorial. A *tutorial* (T) is a group of one to five students and an instructor meeting for discussion which is independent of any other course. For *independent study* students pursue their own interests in reading, research, or writing, but meet with an instructor for guidance and discussion. See the section on independent study in the chapter "Academic Procedures and Information." Instructors in all courses that satisfy the requirements for small group learning experiences, including independent study, must meet with the students at least once every two weeks. The requirements for small group learning experiences are listed under Program I, above.

Course Requirements. Thirty-four semester courses are required for graduation, including a maximum of two courses passed with a grade of D. At least seventeen courses, including the work of the senior year, must be passed at Duke. Twelve courses must be at the advanced (100-200) level. The thirty-four course credits may include (1) no more than thirteen courses in one department; (2) no more than seventeen total for a major under the Bachelor of Arts degree and no more than nineteen total for a major under the Bachelor of Science degree; (3) no more than one semester-course credit in physical education activity and dance activity (i.e., a total of two half-credit activity courses); (4) no more than two credits for house courses; (5) no more than six credits for courses taken in professional schools; and (6) no more than four semester-course credits in military science. Certain military science courses listed as carrying credit do not count toward graduation but appear on a student's permanent academic record. Military science courses, like professional school and all physical education courses, do not satisfy distribution or fields of knowledge requirements. American Dance Festival courses are included in the total limitation on physical education/dance activity courses noted above in this paragraph.

Residence. A residence period of eight semesters is the typical amount of time a student may take to earn either the Bachelor of Arts or the Bachelor of Science degree. This period may be extended for one or two semesters by a student's academic dean for legitimate reasons, if it seems probable that an extension will enable the student to complete all remaining requirements for graduation. A student will not be permitted residence of more than ten semesters in order to be graduated.

For the minimum residence period, at least seventeen courses must be satisfactorily completed at Duke, including the courses needed to meet the senior year residence requirement. (For the purposes of the residence requirement, advanced placement credits are *not* considered as courses taken at Duke.) If only seventeen courses are taken at Duke, they must include the student's last eight courses. A student with more than seventeen courses at Duke may take two of the last eight courses at another approved institution. A student who has completed twenty-six courses at Duke may take four of the last eight courses at another approved institution. Courses taken elsewhere must be approved in advance by the appropriate Director of Undergraduate Studies and the student's academic dean.

Former students of Trinity College or the Woman's College who have been out of college for at least six years may, with certain provisos, take up to eight semester-courses in another institution of approved standing in final fulfillment of graduation requirements. Further information can be obtained from the Associate Dean of Trinity College of Arts and Sciences.

Quality of Work (Continuation Requirements). A student must achieve a satisfactory record of academic performance each term and make satisfactory progress toward graduation each year to continue enrollment in college. A student who fails to meet the minimum requirements described below must leave college for at least two semesters; a summer session may be counted as a semester. The student may apply to Trinity College of Arts and Sciences for readmission. If, after readmission, the student again fails to meet continuation requirements, the student will be ineligible, except in extraordinary instances, for readmission to Trinity College.

Satisfactory Performance Each Term. A student who does not receive a passing grade in all courses must meet the following minimum requirements or be withdrawn from the college.

In the Fall or Spring Semester: (1) in the first semester of enrollment at Duke, a student with a normal course load (of at least four semester courses, as defined in the chapter "Academic Procedures and Information") may not fail more than two full courses; (2) after the first semester at Duke, a student with four or more courses may not fail more than one full course; (3) a first-semester student, whether a freshman or a transfer student, who for a special reason has received permission from an academic dean to enroll in fewer than four courses may not fail more than one full course; (4) a student taking an authorized underload after the first semester at Duke must earn all passing grades. (Students may not carry an underload without the permission of their academic dean.) For the purposes of continuation, incomplete work in any course is considered a failure to achieve satisfactory performance in that course. Therefore, where continuation is in question, incomplete work in any course must be completed with a passing grade in time for final grades to be submitted to the Office of the Registrar no later than the weekday preceding the first day of classes of the spring semester, or prior to the first day of classes of the second term of the summer session, as appropriate. In the case of incomplete work in the spring semester, this requirement applies whether or not the student plans to attend one or more terms of the summer session. The student, however, may not enroll in a summer term at Duke unless the requirement of satisfactory performance each semester has been satisfied.

In the Summer Session: to maintain enrollment at Duke a student may not fail more than one full course in a summer term or a summer session; moreover, a student may not have a failing grade in addition to an incomplete grade in the preceding spring. For purposes of continuation, incomplete work is considered failure to achieve a satisfactory performance in that course. Therefore, when eligibility to continue from the summer session to the fall is in question, incomplete courses must be satisfactorily completed in time for a passing grade to be submitted to the Office of the Registrar no later than the weekday preceding the first day of fall classes. (No student may enter the fall semester with any combination of F or I grades from the preceding spring and summer.)

Any student excluded from the college under the provisions of these regulations may on request have the case reviewed by the Associate Dean of Trinity College of Arts and Sciences.

Satisfactory Progress toward Graduation. Each year prior to the beginning of fall term classes, a student must have made satisfactory progress toward fulfillment of curricular requirements to be eligible to continue in the college; i.e., a certain number of courses must have been passed at Duke according to the following schedule:

Fall Matriculants	
<u>To be eligible to continue to the</u>	<u>A student must have passed at Duke</u>
3rd semester	6 semester courses
5th semester	14 semester courses
7th semester	24 semester courses

Spring Matriculants	
<u>To be eligible to continue to the</u>	<u>A student must have passed at Duke</u>
2nd semester	2 semester courses
4th semester	10 semester courses
6th semester	19 semester courses
8th semester	28 semester courses

For students who have interrupted their university studies, the continuation requirement must still be satisfied before the beginning of each fall term. For such students, the number of courses needed to satisfy the continuation requirement is determined from the table above, based on which semester they will enter in the fall term.

Courses taken in the summer term at Duke may be used to meet this requirement; advanced placement may *not* be used to satisfy it. No more than two courses completed with *D* grades may be counted toward fulfilling this annual continuation requirement.

PROGRAM II

Nature and Purpose. Program II is an alternate approach leading to either the Bachelor of Arts or the Bachelor of Science degree which offers the student who has an unusual interest or talent in a single field, or an unusual combination of interests or talents in several fields, an opportunity to plan and carry out a special curriculum adapted to these interests and needs. The student, with the assistance of a departmental Program II adviser, designs an individual plan of study for the whole or the remainder of the student's college career. Together, they assess the student's background, needs, and ambitions and evaluate the resources at the University or outside it as means of satisfying those ambitions. They consider what academic courses would be useful and also take into account that a term of independent study or work/study on or off campus, or a period of study abroad, might be appropriate. Each curriculum is tailored to the special interests and talents of the student for whom it is designed. Among the many topics for Program II have been American studies, primatology, dramatic literacy, linguistics, biochemistry, mariculture, behavioral science, environmental policy, modern thought, and mass communications.

Admission. Students interested in Program II should confer with the Directors of Undergraduate Studies in the departments closest to their interests, with the dean responsible for Program II, and with the Chairman of the Committee on Program II, whose name may be obtained from 04 Allen Building. If the student seems eligible for Program II, the Director or other departmental adviser, or an interdepartmental committee, will counsel the student concerning the design of the curriculum. When an interdepartmental committee is needed, one department will bear administrative responsibility. The curriculum must be approved by the department and also by the Committee on Program II of the Undergraduate Faculty Council of Arts and Sciences. Upon endorsement by that committee, the program becomes an obligation assumed by the student although it may be modified later with the approval of the department and the Committee on Program II. A description of the plan is sent to the academic dean responsible for Program II, and each semester the student's progress in achieving the plan is reviewed.

Until formally accepted into Program II, a student should register for courses to satisfy the curricular requirements of Program I. Upon acceptance into Program II, a student is relieved of most, but not all, requirements expected of Program I students. Should Program II be dropped for any reason, the student assumes all requirements of Program I. Ordinarily, students will be accepted into Program II only after their first semester at Duke; they are ineligible to apply for admission to Program II after their junior year. Further information about Program II may be obtained from the office of the academic dean responsible for Program II, in 04 Allen Building.



General Requirements. Apart from the requirements arising from the approved plan of work, a Program II student must satisfy certain general requirements: thirty-four semester-course credits for graduation; the regulations on military science courses; and residence, although the requirements relating to the last eight courses may be adjusted to suit the student's approved plan of work. Graduation with distinction is available for qualified students in Program II. See the section on honors in the chapter "Academic Procedures and Information."

Effective for students who matriculated before May 1, 1988:

A variety of approaches to a liberal arts education is provided by Program I and Program II. Either program leads to the Bachelor of Arts or Bachelor of Science degree and requires thirty-two semester courses. Students study in the following divisions of learning:

*Humanities.** Art and Art History, Asian and African languages (Arabic, Chinese, Hebrew, Hindi-Urdu, Japanese, Korean, Persian, and Swahili), classical studies (including Greek and Latin), comparative literature, dance, drama, English, Germanic languages and literature, Institute of the Arts, Judaic studies, music, philosophy, religion, Romance languages (including French, Italian, Portuguese, and Spanish), and Slavic languages and literatures (including Russian and Polish).

Natural Sciences and Mathematics. Biology, botany, chemistry, computer science, genetics, geology, marine sciences, mathematics, physics, statistics, and zoology.

*Social Sciences.** Anthropology, economics, education, history, political science, psychology, public policy studies, and sociology.

PROGRAM I

Program I provides for the experience and achievement that constitute a liberal education. The ability to organize ideas and to communicate them with clarity and precision is refined by completing the writing requirement and the requirements for discussion in small groups. Knowledge of a foreign language contributes to an understanding of the nature of language itself and to perspectives on other cultures. The distribution requirements ensure learning about the concepts and analytical methods in the humanities and the arts, the social sciences, and the natural sciences. Additionally, through a course in the history of civilization students acquire knowledge of the complexity of forces that influence cultures and societies; through a course in literature they learn of the conscious products of the human intellect; and through study in an empirical natural science they gain an understanding of nature and the methods whereby humanity has reached that understanding. Students must complete the requirements listed below and explained, where necessary, on the following pages. No degree requirements, except the requirement for thirty-two course credits and the continuation requirements, may be met by a course passed under the pass/fail option unless the course is offered only on that basis.

Writing

One course in writing (page 21).

Foreign Language

Eligibility to enter the third semester of college language instruction by completing two semester courses in one language at Duke, or the equivalent (page 21).

Distribution of Courses

Students complete the requirements for a major (see pages 27, 29, 30, 31) and in addition take approved courses in each of the following:

- In the history of civilization field: one course, if not included in the major (see page 28 for approved courses);
- In the literature field: one course, if not included in the major (see pages 28, 29 for approved courses);
- In the empirical natural science field: one course, if not included in the major (see page 29 for approved courses);

and in addition:

- In one division† outside that of the major: four semester courses, including two at the advanced level (see pages 27, 28 for excluded courses);
- In the other division† outside that of the major: two semester courses (see pages 27, 28 for excluded courses).

*Afro-American studies; Canadian studies; comparative area studies; distinguished professor courses; film; human development; interdisciplinary courses; linguistics; medieval and Renaissance studies; perspectives in Marxism and society; science, technology, and human values; and women's studies include courses in more than one division. Nondivisional courses in the military sciences and in health, physical education, and recreation are also offered. In addition, advanced students in Trinity College may select a limited number of courses from among certain courses offered by the professional schools at Duke University.

†For the subjects in each division of learning, see page 28.

Small Group Learning Experiences

Courses taught for small groups (page 30), as follows:

- Before reaching junior status: at least *one* full semester course designated as a *seminar*, *tutorial*, or *independent study*; or a combination of two *preceptorials* or *discussion sections*.
- During the junior and senior years: at least *two* semester-course credits for *seminars*, *tutorials*, *independent study*, or a *thesis*.

Course Credits

Thirty-two semester-course credits (no more than two with a grade of *D*), including (page 30):

- At least sixteen at Duke (ordinarily including the senior year).
- At least nineteen outside the major department.
- No more than seventeen total for a Bachelor of Arts major and no more than nineteen total for a Bachelor of Science major.
- At least twelve at the advanced level.
- No more than: one credit of physical education activity and dance activity (i.e., two half-credit activity courses), two credits for house courses (i.e., four half-credit house courses), six from a professional school (e.g., business, engineering, medicine), and four in military science.

Quality of Work

All passing grades are expected, but see page 31 for minimum continuation requirements.

Writing. Students are required to demonstrate ability to write effective English prose by completing a course in expository writing, ordinarily University Writing Course 4, 5, 6, or 7. See the section University Writing Program in the chapter "Courses of Instruction."

Foreign Language. This requirement to assure that students have some knowledge of a foreign culture may be met in any of the following ways: (1) by passing one of the following courses: Arabic 2; Chinese 2, 2A; French 2, 12, 181; German 2, 14, 181; Greek 2, 10, 12, 181S; Hebrew 2; Hindi-Urdu 2; Italian 2, 181; Japanese 2; Korean 2; Latin 2; 181S; Persian 2; Polish 12; Portuguese 181; Religion 116 (Hebrew); Russian 2, 14; Spanish 2, 12, 14, 181; Swahili 2, 14; Yiddish 181; (2) by presenting a College Board Advanced Placement Score of 4 or 5, or score of 3 validated by satisfactory completion of an advanced course; or (3) by achieving a score on a College Board Achievement Test or College Board Placement Test sufficient to permit enrollment at the intermediate level of foreign language instruction (see the chapter "Academic Procedures and Information").

Students whose native language is not English may meet the requirement by successful completion of a course in English composition. Transfer students may satisfy the requirement in any of the above ways or by having fulfilled the foreign language graduation requirement at another college or university prior to entering Duke. Students who have knowledge of a foreign language other than those for which College Board tests are available may request to be examined in that language by special arrangement after matriculation.

Distribution of Courses. Students achieve breadth and balance of intellectual experience by taking courses in each of the three divisions of learning (the humanities, natural sciences, and social sciences, see page 28) and by taking in addition an approved course in each of three selected fields (history of civilization, literature, and empirical natural sciences). Courses that satisfy these requirements consist of the essential subject matter and substance of the discipline. Courses that satisfy the requirements for small group learning experiences may be used also to satisfy these requirements. Courses taken on the pass/fail basis, however, do not satisfy these requirements unless offered only on the pass/fail basis.

Divisions of Learning. Students must complete a certain number of *nonskills* courses in each of the three divisions (see table below):

First Division. The division of the major is called the first division. Each student must complete requirements for a major in a single discipline or in an interdisciplinary program. Thereby the requirement for the first division will automatically be satisfied. See the sections on major below, in the chapter "Academic Procedures and Information," and also the section on the major following each department's course descriptions.

Second Division. Each student must pass at least four semester courses in a second division of the student's choice. At least two of the four courses must be at the 100 or 200 level.

Third Division. Each student must pass at least two semester courses in the remaining division.

COURSES THAT DO NOT SATISFY THE DIVISIONAL DISTRIBUTION REQUIREMENTS—Military and Naval Science Courses, Aerospace Studies Courses, American Dance Festival Courses, Courses in the Professional Schools, Physical Education Courses, and also the Following Skills Courses:

Arabic	1, 2, 63, 64
Art	53, 54, 56

For students who matriculated before May 1, 1988

Arts Institute	20S, 102, 130, 150
Chinese	1, 1A, 2, 2A, 63, 64
Dance	134 and activity courses
Drama	71, 81, 82, 83S, 84, 101, 161, 167, 177
English	3, 12, 28S, 61S, 62S, 71, 72, 73S, 101S
French	1-2, 12, 63, 76, 181
German	1-2, 11, 12, 13, 14, 63, 76, 105, 181, 182
Greek	1-2, 10, 11-12, 181
Hebrew	1, 2, 63, 64
Hindi-Urdu	1, 2, 63, 64
Italian	1-2, 63, 76, 181
Japanese	1, 2, 63, 64
Korean	1, 2, 63, 64
Latin	1-2, 181
Mathematics	9-10, 19
Music	applied music (except for tutorials), 161, 162, 163, 164
Persian	1, 2, 63, 64
Polish	11, 12
Political Science	138, 236
Portuguese	181
Psychology	117
Religion	115-116
Russian	1, 2, 3, 14, 63, 64, 65
Sociology	132, 133
Spanish	1-2, 12, 14, 63, 76, 181
Swahili	1, 2, 14, 63, 64
University Writing	4, 5, 6, 7
Yiddish	181
Zoology	45S, 196D

Fields of Knowledge. In addition to fulfilling the divisional requirements, students must pass one course from each of the following three lists:

COURSES THAT SATISFY THE REQUIREMENTS IN HISTORY OF CIVILIZATION, LITERATURE, AND EMPIRICAL NATURAL SCIENCE

I. History of Civilization

Afro-American Studies	56, 145, 146
Anthropology	101, 102, 120, 121, 122, 123, 124S, 126, 127, 128, 130, 131, 133, 134, 147, 148, 168
Art	69, 70, 114, 123, 124, 126, 131, 132, 133, 134, 140, 141, 142, 143, 145, 147, 148, 149, 151, 152, 153, 161, 165, 186, 189
Classical Studies	11S, 12S, 53, 54, 101, 102, 103, 104, 123, 124, 135, 145, 155
Drama	51, 52
Economics	132, 150, 184
French	136S, 139
German	129, 130
History	21, 21S, 22, 22S, 23, 25, 26, 49S, 53, 54, 75, 76, 91, 91S, 92, 92S, 93S, 100, 101G, 101K, 102G, 103, 104, 107, 108, 110, 111, 112, 113, 115, 116, 117, 120, 121, 122, 123, 124S, 125, 126, 128, 129, 130, 131, 132, 133, 134, 135, 136, 138, 139, 141, 142, 143, 144, 145, 146, 149, 150, 151, 152, 156, 157, 158, 160, 161, 162, 168S, 171, 173, 174, 180, 181, 182, 183S, 184, 193, 194, 199
Interdisciplinary Courses	101, 102, 103, 162, 163, 184
Music	119, 138
Philosophy	93, 94, 108, 117, 119, 120, 132, 138, 139
Political Science	115, 131, 135, 136, 151, 161S, 163, 184, 187
Religion	51, 56, 57, 109, 124, 125, 133, 160, 161, 162, 163
Sociology	111, 138, 170, 180, 184

II. Literature

Afro-American Studies	173, 174
Arabic	171S
Chinese	135, 136, 141S, 142, 171

For students who matriculated before May 1, 1988

Classical Studies	63, 64, 119
Comparative Literature	50, 51, 100, 101, 120, 121, 122, 123, 124, 125, 126, 128, 129, 131, 132, 135, 138, 139, 145, 150, 155, 159, 160, 169, 170, 179, 180, 183, 199S
Distinguished Professor Courses	197S, 201, 203, 205
Drama	55, 64, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124S, 125, 137, 147S, 148, 149, 155
English	20, 21S, 22S, 23S, 24S, 25S, 26S, 49S, 51, 52, 91, 92, 93, 93S, 121, 122, 123, 124, 125, 126, 127, 128, 131, 133, 134, 135, 136, 137, 138, 139S, 141, 143, 144, 145, 148, 151, 152, 153, 154, 155, 161, 162, 163, 164, 165, 167, 168, 169S, 171, 173, 175, 179S, 180, 181, 182, 183, 184, 186, 187, 221, 225, 235, 241, 245, 251, 263, 267, 269, 275
French	101, 102, 103S, 104S, 141S, 142S, 145S, 146S, 147, 148, 151, 152, 153, 155, 156, 158, 162, 163, 166, 167, 170, 248, 251, 252, 255, 256, 257, 258, 261, 263, 265, 266, 290S
German	101, 103S, 104S, 109S, 115S, 125S, 126S, 127S, 131S, 132, 172, 173, 201S, 202S, 205, 206, 207S, 209S, 211S, 214S, 215S, 217S, 230S
Greek	63, 64, 103S, 104S, 203, 205, 222
Interdisciplinary Course	106
Italian	101, 102, 283, 284, 285
Japanese	155, 156, 161
Latin	63, 64, 103S, 104S, 105S, 112S, 117T, 151S, 153S, 201, 203, 204, 210, 221
Persian	101
Philosophy	108
Polish	174
Political Science	174S
Portuguese	182
Religion	50, 52, 55, 106, 108, 128, 147, 172, 188, 233, 287
Slavic Languages and Literatures	124, 161, 162, 175, 176, 177, 180, 181, 183
Spanish	101, 102, 103S, 104S, 105, 106, 107S, 108S, 121, 123S, 141S, 142S, 146, 151, 153, 163, 165S, 166, 171, 245, 246, 253, 254, 258S, 275, 276, 277
Yiddish	171

III. Empirical Natural Science

Unless classified as a skills course, any course offered by the natural science departments (botany, chemistry, geology, physics, zoology) which carries one semester-course credit or more satisfies this requirement.

The Major. Students are expected to acquire some mastery of a particular discipline or interdisciplinary area as well as to achieve a breadth of intellectual experience. They therefore complete a departmental major, an interdisciplinary major, or an interdepartmental concentration. At least half the courses for a student's major field must be taken at Duke although departments may make exceptions to this rule in special circumstances. A student who completes requirements for two majors may have both recorded on the official record. See the chapter "Academic Procedures and Information" for the majors within each degree and for procedures on declaring a major.

Departmental Major. The courses for a departmental major may include introductory or basic prerequisite courses and higher-level courses in the major department or in the major department and related departments. The courses required in the major department must include at least five beyond the introductory or basic prerequisite level, but may not exceed eight semester course credits for the Bachelor of Arts degree or ten for the Bachelor of Science degree. Students may elect a more intensive major program, but only thirteen courses in one department count toward the graduation requirement of thirty-two semester courses. Furthermore, the total number of courses at any level in the major and in related departments may not exceed seventeen semester courses for the Bachelor of Arts degree and nineteen semester courses for the Bachelor of Science degree. Departmental majors are available in anthropology, art design, art history, botany, chemistry, classical studies, economics, English, French, geology, Germanic languages and literature, Greek, history, Latin, mathematics, music, philosophy, physics, political science, psychology, public policy studies, religion, Slavic languages and literatures, sociology, Spanish, and zoology. The courses required for a major are specified by the department. The requirements appear in the section following each department's course descriptions.

Program Major. Students may satisfy the requirement by completing work prescribed for a major in approved programs, often interdisciplinary. These programs include Afro-American studies, biology, Canadian studies, comparative area studies, comparative literature, drama, and medieval and Renaissance studies. The requirements for these majors appear under each program in the chapter "Courses of Instruction."

Interdepartmental Concentration. A student may pursue an interdepartmental major program designed by the student and advisers as an alternate means of satisfying the major requirement. An interdepartmental concentration consists of at least three courses beyond the introductory level in each of two or more departments. For procedures see the section on declaration of major or division in the chapter "Academic Procedures and Information."

For students who matriculated before May 1, 1988

Small Group Learning Experiences. By supplementing the classroom and lecture methods of instruction, small group learning experience courses assure students opportunities to engage in discussion, develop skills, refine judgment, and defend ideas when challenged. A *seminar* (ordinarily indicated by the suffix S) is an independent course of twelve to fifteen (exceptionally to twenty) students who, together with an instructor, engage in disciplined discussion. The number of meeting hours per term is the same as for regular courses of equivalent credit. Instructors are encouraged to present to each student at the end of the term a written evaluation of the student's work. A *discussion section* (D) is a group of approximately ten students and an instructor, in which discussion is the paramount characteristic; it is an integral part of a larger regular course, and every member of the class is enrolled. A *preceptorial* (P) is a group of usually no more than twelve students and an instructor in which discussion is the primary component; it is an additional and optional unit attached to a regular course involving one or more extra meetings per week. No additional course credit is given for a preceptorial. A *tutorial* (T) is a group of one to five students and an instructor meeting for discussion which is independent of any other course. For *independent study* students pursue their own interests in reading, research, or writing, but meet with an instructor for guidance and discussion. See the section on independent study in the chapter "Academic Procedures and Information." Instructors in all courses that satisfy the requirements for small group learning experiences, including independent study, must meet with the students at least once every two weeks. The requirements for small group learning experiences are listed under Program I, above.

Course Requirements. Thirty-two semester courses are required for graduation, including a maximum of two courses passed with a grade of D. At least sixteen courses, including the work of the senior year, must be passed at Duke. Twelve courses must be at the advanced (100-200) level. The thirty-two course credits may include (1) no more than thirteen courses in one department; (2) no more than seventeen total for a major under the Bachelor of Arts degree and no more than nineteen total for a major under the Bachelor of Science degree; (3) no more than one semester-course credit in physical education activity and dance activity (i.e., a total of two half-credit activity courses); (4) no more than two credits for house courses; (5) no more than six credits for courses taken in professional schools; and (6) no more than four semester-course credits in military science. Certain military science courses listed as carrying credit do not count toward graduation but appear on a student's permanent academic record. Military science courses, like professional school and all physical education courses, do not satisfy distribution or fields of knowledge requirements. American Dance Festival courses are included in the total limitation on physical education/dance activity courses noted above in this paragraph.

Residence. A residence period of eight semesters is the typical amount of time a student may take to earn either the Bachelor of Arts or the Bachelor of Science degree. This period may be extended for one or two semesters by a student's academic dean for legitimate reasons, if it seems probable that an extension will enable the student to complete all remaining requirements for graduation. A student will not be permitted residence of more than ten semesters in order to be graduated.



For students who matriculated before May 1, 1988

For the minimum residence period, at least sixteen courses must be satisfactorily completed at Duke, including the courses needed to meet the senior year residence requirement. (For the purposes of the residence requirement, advanced placement credits are *not* considered as courses taken at Duke.) If only sixteen courses are taken at Duke, they must include the student's last eight courses. A student with more than sixteen courses at Duke may take two of the last eight courses at another approved institution. A student who has completed twenty-four courses at Duke may take four of the last eight courses at another approved institution. Courses taken elsewhere must be approved in advance by the appropriate Director of Undergraduate Studies and the student's academic dean.

Former students of Trinity College or the Woman's College who have been out of college for at least six years may, with certain provisos, take up to eight semester courses in another institution of approved standing in final fulfillment of graduation requirements. Further information can be obtained from the Associate Dean of Trinity College of Arts and Sciences.

Quality of Work (Continuation Requirements). A student must achieve a satisfactory record of academic performance each term and make satisfactory progress toward graduation each year to continue enrollment in college. A student who fails to meet the minimum requirements described below must leave college for at least two semesters; a summer session may be counted as a semester. The student may apply to Trinity College of Arts and Sciences for readmission. If, after readmission, the student again fails to meet continuation requirements, the student will be ineligible, except in extraordinary instances, for readmission to Trinity College.

Satisfactory Performance Each Term. A student who does not receive a passing grade in all courses must meet the following minimum requirements or be withdrawn from the college.

In the Fall or Spring Semester: (1) in the first semester of enrollment at Duke, a student with a normal course load (of at least four semester courses, as defined in the chapter "Academic Procedures and Information") may not fail more than two full courses; (2) after the first semester at Duke, a student with four or more courses may not fail more than one full course; (3) a first-semester student, whether a freshman or a transfer student, who for a special reason has received permission from an academic dean to enroll in fewer than four courses may not fail more than one full course; (4) a student taking an authorized underload after the first semester at Duke must earn all passing grades. (Students may not carry an underload without the permission of their academic dean.) For the purposes of continuation, incomplete work in any course is considered a failure to achieve satisfactory performance in that course. Therefore, where continuation is in question, incomplete work in any course must be completed with a passing grade in time for final grades to be submitted to the Office of the Registrar no later than the weekday preceding the first day of classes of the spring semester, or prior to the first day of classes of the second term of the summer session, as appropriate. In the case of incomplete work in the spring semester, this requirement applies whether or not the student plans to attend one or more terms of the summer session. The student, however, may not enroll in a summer term at Duke unless the requirement of satisfactory performance each semester has been satisfied.

In the Summer Session: to maintain enrollment at Duke a student may not fail more than one course in a summer term or a summer session; moreover, a student may not have a failing grade in addition to an incomplete grade in the preceding spring. For purposes of continuation, incomplete work is considered failure to achieve satisfactory performance in that course. Therefore, when eligibility to continue from the summer session to the fall is in question, incomplete courses must be satisfactorily completed in time for a passing grade to be submitted to the Office of the Registrar no later than the weekday preceding the first day of fall classes. (No student may enter the fall semester with any combination of *F* or *I* grades from the preceding spring and summer.)

Any student excluded from the college under the provisions of these regulations may on request have the case reviewed by the Associate Dean of Trinity College of Arts and Sciences.

Satisfactory Progress toward Graduation. Each year prior to the beginning of fall term classes, a student must have made satisfactory progress toward fulfillment of curricular requirements to be eligible to continue in the college; i.e., a certain number of courses must have been passed at Duke according to the following schedule:

To be eligible to continue to the:	A student must have passed at Duke:
3rd semester	6 semester courses
4th semester	10 semester courses
5th semester	14 semester courses
6th semester	18 semester courses
7th semester	22 semester courses
8th semester	26 semester courses

Courses in the arts and sciences taken in the summer terms at Duke may be used to meet this requirement; advanced placement may *not* be used to satisfy it. No more than two courses completed with *D* grades may be counted toward fulfilling this annual continuation requirement.

PROGRAM II

Nature and Purpose. Program II is an alternate approach leading to either the Bachelor of Arts or the Bachelor of Science degree which offers the student who has an unusual interest or talent in a single field, or an

For students who matriculated before May 1, 1988

unusual combination of interests or talents in several fields, an opportunity to plan and carry out a special curriculum adapted to these interests and needs. The student, with the assistance of a departmental Program II adviser, designs an individual plan of study for the whole or the remainder of the student's college career. Together, they assess the student's background, needs, and ambitions and evaluate the resources at the University or outside it as means of satisfying those ambitions. They consider what academic courses would be useful and also take into account that a term of independent study or work/study on or off campus, or a period of study abroad, might be appropriate. Each curriculum is tailored to the special interests and talents of the student for whom it is designed. Among the many topics for Program II have been American studies, primatology, dramatic literacy, linguistics, biochemistry, mariculture, behavioral science, environmental policy, modern thought, and mass communications.

Admission. Students interested in Program II should confer with the Directors of Undergraduate Studies in the departments closest to their interests, with the dean responsible for Program II, and with the Chairman of the Committee on Program II, whose name may be obtained from 04 Allen Building. If the student seems eligible for Program II, the Director or other departmental adviser, or an interdepartmental committee, will counsel the student concerning the design of the curriculum. When an interdepartmental committee is needed, one department will bear administrative responsibility. The curriculum must be approved by the department and also by the Committee on Program II of the Undergraduate Faculty Council of Arts and Sciences. Upon endorsement by that committee, the program becomes an obligation assumed by the student although it may be modified later with the approval of the department and the Committee on Program II. A description of the plan is sent to the academic dean responsible for Program II, and each semester the student's progress in achieving the plan is reviewed.

Until formally accepted into Program II, a student should register for courses to satisfy the curricular requirements of Program I. Upon acceptance into Program II, a student is relieved of most, but not all, requirements expected of Program I students. Should Program II be dropped for any reason, the student assumes all requirements of Program I. Ordinarily, students will be accepted into Program II only after their first semester at Duke; they are ineligible to apply for admission to Program II after their junior year. Further information about Program II may be obtained from the office of the academic dean responsible for Program II, in 04 Allen Building.

General Requirements. Apart from the requirements arising from the approved plan of work, a Program II student must satisfy certain general requirements: thirty-two semester-course credits for graduation; the regulations on military science courses; and residence, although the requirements relating to the last eight courses may be adjusted to suit the student's approved plan of work. Graduation with distinction is available for qualified students in Program II. See the section on honors in the chapter "Academic Procedures and Information."

COMBINATION PROGRAMS OF TRINITY COLLEGE AND DUKE PROFESSIONAL SCHOOLS

A student interested in attending a Duke professional school (business, forestry and environmental studies, law, and medicine) may, upon meeting certain requirements, combine the senior year in Trinity College of Arts and Sciences with the first year in the professional school. To qualify the student must (1) successfully complete twenty-six semester courses in Trinity College (twenty-four for students who matriculated prior to May 1, 1988); (2) fulfill all other degree requirements in Trinity College except for eight elective courses; (3) obtain the approval of the appropriate preprofessional adviser and academic dean in Trinity College; and (4) be admitted to the professional school. If the student's application to the professional school is accepted, the student transfers to the professional school for the fourth year and begins work on the professional degree. Upon successful completion of the work in the first year of the professional school, the baccalaureate degree is awarded to the student. The undergraduate record notes the student's enrollment in the combination program, the name of the professional school, the date of graduation from Trinity College, and the degree awarded, but it does not include courses taken in the professional school. Counseling and additional information are available from the preprofessional advisers.

PREPARATION FOR GRADUATE AND PROFESSIONAL SCHOOLS

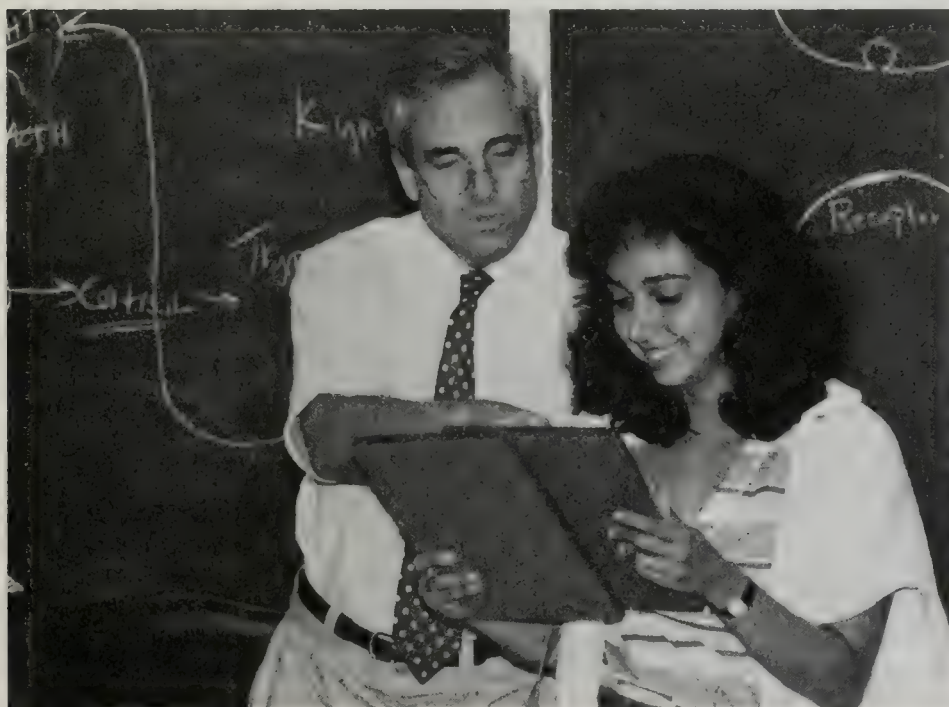
Students planning to enter a graduate or professional school should consult their academic deans and faculty advisers at the earliest opportunity. Since many graduate

and professional schools require special tests for students seeking admission, information regarding requirements should also be obtained from the catalogs of the appropriate schools. The Office of Counseling and Psychological Services will provide applications for the testing programs.

Graduate Schools of Arts and Sciences. As soon as practicable, students should ascertain the requirements of the graduate schools which they are considering and should consult an adviser in the field of the proposed advanced study. Most graduate schools have requirements in foreign languages, and candidates for the degree of Doctor of Philosophy may be required to pass reading examinations, usually in German and French.

Graduate Schools of Engineering. Students interested in graduate work in engineering should consult the Dean of the School of Engineering or the Director of Graduate Studies in one of the engineering departments. Most engineering graduate schools require that a candidate have the equivalent of a Bachelor of Science in Engineering degree; however, students in the natural and social sciences may obtain conditional admission if they have a sufficient background in mathematics.

Graduate Schools of Business Administration. Students seeking advice concerning preparation for graduate school in business administration should consult the adviser for graduate business programs in Trinity College. Many graduate programs in business administration are designed specifically for students with little or no undergraduate work in business. In general, a student should seek a good liberal arts background, which will help develop communication skills, analytical skills, and an understanding of human nature. Students have often chosen such courses as Computer Science 51, Economics 1 and 2 (or 51 and 52), Management Sciences 53, or Mathematics 31 as those which develop analytical skills. For further information concerning undergraduate preparation see the *Prebusiness Handbook for Duke Students* or the *Official Guide to MBA Programs*, published by the Graduate Management Admission Council; these publications and other resource materials are available in the office of the prebusiness adviser in the college.



Medical and Dental Schools. Students planning to enter schools of medicine and dentistry can prepare for admission by completing any of the regular departmental majors in Program I or by completing Program II, and by taking those courses required by the professional schools of their choice. Virtually all medical schools and most schools of dentistry require the same basic group of college premedical courses—a year of biology, a year each of inorganic and organic chemistry, and a year of general physics. In addition, many schools require a year of English and courses in the humanities or social sciences. About a third of all medical schools require a year of college mathematics and some specify calculus, statistics, or computer science. For a complete listing of these and any additional course requirements set by each school, consult *Medical School Admissions Requirements*, published by the Association of American Medical Colleges or *Admission Requirements of U.S. and Canadian Dental Schools*, published by the American Association of Dental Schools. These and similar resources for schools of optometry and veterinary medicine are located in the Health Professions Advising Office. Students should discuss their programs of study with their major advisers, academic deans, and with the adviser for the health professions.

Graduate Programs in the Health Professions. Students interested in careers as physical therapists, health administrators, or others of the allied health professions should prepare with course work in the natural sciences and behavioral sciences within a liberal arts curriculum. Descriptive literature on each of the allied health schools and professions is part of the library maintained in the Health Professions Advising Office. Students will also find publications of selected advanced degree programs in biomedical research, including the combined M.D./Ph.D. degree programs.

Law Schools. Students who plan to prepare for law school should seek diversity in their undergraduate course programs and specialize in one or more areas. They may choose virtually any field for their major work. Although no specific courses are required, prelaw students have often chosen from the following courses: Management Sciences 53; Economics 51, 52; English 91; History 21, 22, 91, 92, 105, 106; Philosophy 41, 48; Political Science 91; Public Policy Studies 55; Sociology 10D.

For a fuller discussion of undergraduate preparation for the study of law, students should refer to the *Duke Prelaw Handbook* or the *Prelaw Handbook* published by the Association of American Law Schools and the Law School Admission Council, or consult with the prelaw adviser in the college.

Theological Schools and Religious Work. Students contemplating theological study should correspond at the earliest opportunity with the appropriate schools and with the authorities of their churches to learn how to prepare for the specific programs they expect to enter. Probably, they will find that they should consider the following subjects: English language and literature; history, including non-Western cultures as well as European and American; philosophy, particularly its history and its methods; natural sciences, both the physical and the life sciences; psychology, sociology, and anthropology; the fine arts and music; biblical and modern languages; religion, both in the Judaeo-Christian and in the Near and Far Eastern traditions. Some seminaries require Greek or Hebrew for admission. It is the understanding gained in these fields rather than the total number of credits or semester hours earned which is significant. More detailed information about theological education, not limited to Duke, may be obtained from the Director of Admissions of the Divinity School.

The School of Engineering

Duke University offers in the School of Engineering programs of study which lead to the degree of Bachelor of Science in Engineering. Four programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and

Technology (ABET). These programs are biomedical engineering, civil engineering, electrical engineering, and mechanical engineering. These accredited programs, and special programs of study in interdisciplinary fields, are offered by the Departments of Biomedical Engineering, Civil and Environmental Engineering, Electrical Engineering, and Mechanical Engineering and Materials Science.

For graduation with a Bachelor of Science in Engineering degree, a student must complete successfully a minimum of thirty-four semester courses. These thirty-four semester courses must include the following:

General Requirements*

Writing	1 s.c.	This requirement is met by completing a University Writing Course.
Mathematics	4 s.c.	This requirement is met by completing Mathematics 31†, 32†, and 103; plus 104 or 111 or 135.
Natural Science	4 s.c.	This requirement is met by completing Chemistry 11, Physics 51 and 52, and an elective course in one of the natural science departments which presents fundamental knowledge about nature and its phenomena, preferably including quantitative expression.‡
Social Sciences and Humanities	5 s.c.	This requirement is met by completion of five courses from at least two departments, one in the humanities and one in social sciences. One course must be 100-level or above. This program of courses should reflect a rationale or fulfill an objective appropriate to the engineering profession. Courses selected must be those which present essential subject matter and substance of the discipline; for example, no introductory skill courses may be used to satisfy this requirement. Likewise, courses devoted primarily to subjects such as accounting, management science, industrial management, finance, personnel administration, introductory language, and ROTC normally do not fulfill this objective regardless of their general value in the total engineering curriculum. Courses taught in professional schools may not be used to satisfy this requirement.

*House courses cannot be used to meet Bachelor of Science in Engineering degree requirements.
†Mathematics 33 and 34 are acceptable in lieu of Mathematics 31 and 32.
‡Courses in mathematics, statistics, and computer science will not meet this requirement. A list of disallowed courses is maintained in the Dean's office.



Engineering and Applied Sciences	4 s.c.	This requirement is met by completion of one course from each of four of the following six areas: electrical science, information and computer science, mechanics (solid and fluid), materials science, systems analysis, and thermal science and transfer processes. See departmental requirements, which follow, for any specific courses to be included.
Digital Computation		Students are expected to have acquired digital-computer programming capability before their sophomore year. The programming capability may be satisfied by prior experience or by passing Engineering 51, Engineering 52, or Computer Science 51.

Departmental Requirements

Departmental Specifications	16 s.c.	The department administering the major field of study will specify this requirement. In general, it will consist of both required courses and electives to be planned in consultation with the departmental adviser. Including the 4 s.c. in engineering and applied sciences listed under general requirements, a total of 8.5 s.c. equivalents in engineering science and 4.25 s.c. equivalents in engineering design are required. See the individual departmental requirements, which follow.
*Total Minimum Requirement	34 s.c.	

*A maximum of two semester courses of junior or senior level air science, military science, or naval science course work may be counted in satisfying the minimum requirements of thirty-four semester courses for a baccalaureate degree in engineering. These courses must be included in the sixteen semester courses listed under departmental requirements. All other courses completed in air, military, or naval science are taken in addition to the minimum program.

Biomedical Engineering Departmental Requirements

All general requirements and departmental requirements comprising the accredited biomedical engineering major are incorporated in the following sequence, only one of several possible sequences. The student is encouraged to choose electives and select a sequence which develops broad intellectual interests.

Freshman Year

First Semester	Courses	Second Semester	Courses
Chemistry 11	1	Chemistry 12	1
University Writing Course	1	Physics 51	1
Mathematics 31	1	Mathematics 32	1
Engineering 51 or Social Science or Humanities Elective	1	Social Science or Humanities Elective or Engineering 51	1
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Physics 52	1	Biomedical Engineering 163	1
Electrical Engineering 61	1	Elective	1
Mathematics 103	1	Mathematics 111	1
Social Science or Humanities Elective	1	Social Science or Humanities Elective	1
Elective	1		4
	5		

Junior Year

First Semester	Courses	Second Semester	Courses
Biomedical Engineering 110	1	Biomedical Engineering 145	1
Biomedical Engineering 101	1	Life Science Elective	1
Electrical Engineering 112 or Biomedical Engineering 171	1	Biomedical Engineering 164	1
Elective	1	Biomedical Engineering Elective	1
	<u>4</u>		<u>4</u>

Senior Year

First Semester	Courses	Second Semester	Courses
Biomedical Engineering 207	1	Biomedical Engineering Elective	1
Biomedical Engineering Elective	1	Biomedical Engineering Elective	1
Life Science Elective	1	Elective	1
Social Science or Humanities Elective	1	Elective	1
Social Science or Humanities Elective	1		<u>4</u>
	<u>5</u>		

Premedical students should schedule Chemistry 151, 152, and two life science electives before the end of their junior year by deferring some required courses to the senior year. Biomedical engineering electives include all courses with biomedical engineering numbers other than required courses.

Civil And Environmental Engineering Departmental Requirements

The general requirements and departmental requirements comprising the accredited civil engineering major are all incorporated in the following typical program.

Freshman Year

First Semester	Courses	Second Semester	Courses
Chemistry 11	1	Engineering 24	1
Mathematics 31	1	Mathematics 32	1
University Writing Course	1	Physics 51	1
Engineering 51 or 52 or Social Science-Humanities Elective	1	Social Science-Humanities Elective or Engineering 51 or 52	1
	<u>4</u>		<u>4</u>

Sophomore Year

First Semester	Courses	Second Semester	Courses
Engineering 75	1	Engineering 123	1
Mathematics 103	1	Mathematics 111	1
Physics 52	1	Natural Science Elective	1
Social Science-Humanities Elective	1	Elective	1
	<u>4</u>		<u>4</u>

Junior Year

First Semester	Courses	Second Semester	Courses
Civil Engineering 122	1	*Civil Engineering Elective	1
Civil Engineering 131	1	Civil Engineering Elective	1
Social Science-Humanities Elective	1	Social Science-Humanities Elective	1
Statistics 100	1	Elective	1
Elective	1		<u>4</u>
	<u>5</u>		

Senior Year

First Semester	Courses	Second Semester	Courses
†Advanced Civil Engineering Elective	1	†Advanced Civil Engineering Elective	1
*Civil Engineering Elective	1	*Civil Engineering Elective	1

*These five courses shall be chosen from the following: Civil Engineering 116, 123, 124, 133, 134, 139, 150.

†Any 200-level civil engineering course.

*Civil Engineering Elective	1
Social Science-Humanities Elective	1
Elective	1
	<u>4</u>

Elective	1
Elective	1
	<u>1</u>
	4

*These five courses shall be chosen from the following: Civil Engineering 116, 123, 124, 133, 134, 139, 150.

In order to satisfy the School of Engineering distributional requirements of four courses in engineering and applied science, the student must take at least two courses from the following: Engineering 83, Engineering 101, Electrical Engineering 61, or Engineering 151.

Electrical Engineering Departmental Requirements

The general requirements and departmental requirements comprising the accredited electrical engineering major are all incorporated in the following program. This program is presented as a guide to assist students in planning their four-year program and should not be viewed as an inflexible sequencing of courses.

Freshman Year

First Semester	Courses	Second Semester	Courses
Mathematics 31	1	Mathematics 32	1
Chemistry 11	1	Physics 51	1
University Writing Course	1	Approved Elective	1
Engineering 51 or Computer Science 51 or Social Science-Humanities Elective	1	Engineering 51 or Computer Science 51 or Social Science-Humanities Elective	1
	<u>4</u>		<u>4</u>

Sophomore Year

First Semester	Courses	Second Semester	Courses
Electrical Engineering 61	1	Electrical Engineering 62	1
Mathematics 103	1	Electrical Engineering 112	1
Physics 52	1	Mathematics 104, 111, or 135	1
Social Science-Humanities Elective	1	Social Science-Humanities Elective	1
	<u>4</u>		<u>4</u>

Junior Year

First Semester	Courses	Second Semester	Courses
*Electrical Engineering	1	*Electrical Engineering	1
*Electrical Engineering	1	*Electrical Engineering	1
†Mathematics	1	‡Natural Science	1
Social Science-Humanities Elective	1	Approved Elective	1
	<u>4</u>		<u>4</u>

*These four courses must be chosen from the following: Electrical Engineering 103, 143, 157, 161, 186, 199.

†Any 100-level math course except 123, 128, 150, or 183.

‡One of the following: Chemistry 12; Physics 105, 161, 176S, 181, and 185; Biology 14 is recommended.

Senior Year

First Semester	Courses	Second Semester	Courses
Approved Electrical Engineering Elective	1	Approved Electrical Engineering Elective	1
Approved Electrical Engineering Elective	1	Social Sciences-Humanities Elective	1
Approved Elective	1	Approved Elective	1
Approved Elective	1	Approved Elective	1
*Approved Elective	1	*Approved Elective	1
	<u>5</u>		<u>5</u>

*May be taken during junior year

Note: The selection of approved electives should take into account a departmental requirement that a student must have accumulated by graduation time the equivalent

of 4.25 engineering design and 8.5 engineering science courses. Engineering 23, Engineering 174, and Engineering 175 may not be counted toward the departmental requirement.

In order to satisfy the School of Engineering distributional requirement of four courses in engineering and applied science, the student may use Electrical Engineering 61 as an electrical science course and Electrical Engineering 112 as a systems analysis course. The remaining two courses may be selected from any two of the following areas: information and computer science (Engineering 51 or Computer Science 51 may be used to satisfy this requirement), mechanics, materials science, and thermal sciences.

An up-to-date list of acceptable *engineering design* and *engineering science* courses may be obtained from the departmental office.

Mechanical Engineering and Materials Science Departmental Requirements

The general requirements and departmental requirements comprising the accredited mechanical engineering major are all incorporated in the following typical program.

Freshman Year

First Semester	Courses	Second Semester	Courses
Mathematics 31	1	Mathematics 32	1
Chemistry 11	1	Physics 51	1
University Writing Course	1	Engineering 83	1
Engineering 51 or *Elective	1	*Elective or Engineering 51	1
	4		4

Sophomore Year

First Semester	Courses	Second Semester	Courses
Mathematics 103	1	Mathematics 111	1
Physics 52	1	Engineering 123 or	
Engineering 75	1	Mechanical Engineering 120†	1
*Elective	1	Engineering 101 or 130+	1
	4	*Elective	1
			4

Junior Year

First Semester	Courses	Second Semester	Courses
Engineering 130 or 101+	1	Physics 171	1
Mechanical Engineering 120 or		Mechanical Engineering 141 or 115+	1
Engineering 123†	1	Mechanical Engineering 150 or 126†	1
Mechanical Engineering 126 or *Elective†	1	Mathematics 114 or *Elective	1
Mechanical Engineering 115 or		*Elective	1
Mathematics 114†	1		
*Elective	1		5
	5		

Senior Year

First Semester	Courses	Second Semester	Courses
Mechanical Engineering 160 or 141+	1	*Elective or	
*Elective or		Mechanical Engineering 160+	1
Mechanical Engineering 150+	1	*Elective	1
‡Advanced Technical Elective	1	‡Advanced Technical Elective	1
‡Advanced Technical Elective	1	‡Advanced Technical Elective	1
	4		4

*Part of a program of approved elective courses planned with the student's faculty adviser to suit individual interests and abilities. The program must include a minimum of five social science-humanities courses, at least one of which must be 100-level or above.

†Designates an either/or sequence of courses, one sequence of which should be followed throughout the entire program.

‡Part of a program of four advanced level elective courses from the areas of engineering, mathematics, or science which normally build upon the program of required courses. Three of these electives must be advanced engineering courses and of these three, two must be Mechanical Engineering courses.

The major requirements are included in the minimum total of thirty-four courses listed under general requirements and departmental requirements. Specific courses which must be included are Engineering 75, 83, 101, 123, and 130; Mechanical Engineering 115, 120, 126, 141, 150, and 160.

Declaration of Major. A student is urged to declare a major by the time of registration for the first semester of the sophomore year, but is required to do so by the time of registration for the first semester of the junior year. Declaration of major is accomplished by completing a form available in the Office of the Dean of Engineering.

Double Major. If an engineering student completes simultaneously the requirements for a departmental major in arts and sciences and the requirements for a Bachelor of Science in Engineering degree, or satisfies simultaneously the requirements for two engineering majors, the official record will indicate this fact. However, the Director of Undergraduate Studies for the second major must certify that the departmental major requirements have been met. The student must initiate the procedure, either through the Dean of the School of Engineering or through the Director of Undergraduate Studies in the second department. The completion of the requirements for the major in this department must be confirmed no later than the time of registration for the final semester. Courses which are common to both majors shall be counted toward satisfying the requirements of both majors.

Interdisciplinary Programs in Engineering. These programs parallel the major programs in biomedical, civil, electrical, and mechanical engineering, but are not individually accredited by ABET. They provide special opportunities for study in interdisciplinary fields, such as energy conversion, biochemical engineering, engineering mechanics, materials science, ocean engineering, pollution control, systems and controls, and urban engineering, leading to the Bachelor of Science in Engineering degree, which may be arranged with approval of the engineering faculty. Any student, in consultation with the adviser or another faculty member, may propose a unique combination of courses designed to meet particular career objectives. The proposal should be submitted to the Engineering Faculty Council, through the Dean of the School of Engineering, for approval; it may be submitted as early as the second semester of the freshman year and must be submitted before the beginning of the senior year. The proposal should include the student's reasons for pursuing the suggested program of study, and it must show how the proposed courses satisfy the following requirements:

1. The proposed program of study meets the general requirements for the Bachelor of Science in Engineering degree but cannot be accommodated by the approved departmental requirements in biomedical, civil and environmental, or electrical engineering, or mechanical engineering and materials science.
2. A program of at least eight engineering courses is included to provide depth in the chosen interdisciplinary area of study.
3. A program of at least four courses, in addition to the seventeen courses listed under general requirements, is included to provide breadth in technical areas (engineering, natural science, and mathematics).
4. The remaining courses, which are treated as electives, require the approval of the student's adviser.

Each student enrolled in an approved interdisciplinary program will be assigned to the appropriate engineering department for administrative purposes.

Program in Engineering and Public Policy. Engineering students may pursue a program of study leading to the degree of Bachelor of Science in Engineering, with a major in one of the five engineering fields of study and a second major in public policy studies. The program is sponsored by the School of Engineering and the Institute of Policy Sciences and Public Affairs. To qualify for a degree with this second major, a student must satisfy the series of courses, which may be characterized as electives within the

engineering curriculum, that meet the requirements for the major in public policy studies. These requirements are a modified parallel of the requirements of the major in public policy studies as described in the "Courses of Instruction" chapter in this bulletin.

Bachelor of Science in Engineering/Master of Science Program. This program provides students with an opportunity to plan a coordinated five-year program of studies in the School of Engineering leading to both the Bachelor of Science in Engineering and Master of Science degrees. Application for admission to this integrated program may be made during the junior or senior year. Provisional admission to the Graduate School may be granted when the student enrolls for the semester during which the Bachelor of Science in Engineering degree requirements will be completed. Graduate level courses during this period which are in excess of Bachelor of Science in Engineering requirements may be credited toward fulfillment of the Master of Science degree requirements.

Students must complete thirty semester hours of credit specifically approved for the Master of Science degree under the prevailing graduate rules; up to six of these hours may be thesis research if the program includes a written master's thesis. No more than nine semester hours of graduate work can be completed concurrently with completing the Bachelor of Science in Engineering degree requirements.

Residence Requirements. At least seventeen semester courses must be completed satisfactorily at Duke. This must include the work of the final two semesters, with the following exceptions: the student who has completed more than four full semesters of work at Duke may take the last two courses elsewhere; others may take the last course elsewhere. The courses taken elsewhere must be approved in advance by the student's major adviser and academic dean.

Pass/Fail Grading Option. With the consent of the instructor and the faculty adviser, an engineering student may choose to be graded on a pass/fail basis in up to four unrestricted electives or social sciences-humanities electives within the thirty-four-course program. A student may take no more than one course on a pass/fail basis each semester.

Repetition of Courses. An engineering student who has earned a grade of *D-*, *D*, or *D+* in a required mathematics course or a required engineering course may, with permission of his or her adviser, Director of Undergraduate Studies, and academic dean, repeat the course. Both grades will remain on the student's record. Only one credit may be counted toward fulfilling graduation requirements.

Annual Recognition. In acknowledgment of high academic achievement, recognition is given each summer to freshmen, sophomores, juniors, and seniors if the following requirements are met:

1. A normal academic load has been carried in the fall and spring terms.
2. Grades other than *P* have been earned in six semester courses.
3. No incomplete or failing grade has been received during the fall and spring terms.

The *Dean's List* recognizes students who earn a 3.3 average on all work in both the fall and spring terms. The *Dean's List with Distinction* includes students who earn a 3.6 on all work in both the fall and spring terms of an academic year.

Continuation Requirements. A student must achieve a satisfactory record of academic performance each semester and make satisfactory progress toward graduation to remain enrolled in the University.

A student must pass at least three courses in each semester, except for the first semester of the freshman year, in which at least two courses must be passed. A student who fails to meet this continuation requirement must leave the University for at least two semesters. A complete summer session may be counted as a semester. Following application for readmission, return must be approved by the Dean and the Director of Undergraduate Studies in the student's major department. If the student thereafter fails to pass three courses in a semester, permanent dismissal from the University usually

results. A student who enrolls in more than four courses in a given semester and fails two or more of them will not be permitted to enroll for more than four courses in the following semester without approval of the Dean. In addition, a student may be dismissed temporarily or permanently for failing to make satisfactory progress toward graduation, including satisfactory progress toward fulfillment of curricular requirements within ten semesters.

The term *satisfactory progress* shall be defined also by the following schedule:

1. To begin enrollment in the second year, a student must have passed 6 s.c. and earned *P*, *C-*, or better in 4 s.c.*
2. To begin enrollment in the third year, a student must have passed 13 s.c. and earned *P*, *C-*, or better in 11 s.c.
3. To begin enrollment in the fourth year, a student must have passed 20 s.c. and earned *P*, *C-*, or better in 18 s.c.
4. To begin enrollment in the fifth year, a student must have passed 27 s.c. and earned *P*, *C-*, or better in 25 s.c.

Grade Requirement for Graduation. Of the thirty-four semester courses which fulfill the specified categories in the Bachelor of Science in Engineering degree requirements, thirty-two or their equivalent in number must be passed with grades of *P*, *C-*, or better.

*Continuation from the first to second year shall be based only on course credits earned at Duke and credits received through the Advanced Placement program.



Academic Procedures and Information



Advanced Placement

Scores on the tests discussed below and documented previous educational experience are the criteria used to determine a student's qualifications for certain advanced courses. If questions arise, students should consult the Director of Undergraduate Studies in the appropriate department.

College Board Advanced Placement Program (APP) Examinations. A score of 4 or 5 on College Board Advanced Placement Program Examinations, taken prior to matriculation in college, is the basis for consideration for credit and placement in advanced courses in art, botany, chemistry, computer science, English,* French, German, history, Latin, music, physics†, political science, Spanish, and zoology. The Department of Mathematics will consider a score of 3 for placement beyond the introductory course. The record of a student presenting such a score and desiring to continue in the same subject at Duke will be evaluated for credit and for placement in an advanced course. Departmental policies regarding advanced placement and credit may vary. In the case of French, German, Latin, and Spanish, APP scores of 4 or 5 may result in placement in courses at the 100 level; approval of the Director of Undergraduate Studies or Supervisor of Freshman Instruction in the appropriate department is required before final placement is made. Credit may be granted for one or two courses in each subject area, with the approval of the academic department concerned. Also, see the section on residence requirements in the chapter "Degree Programs."

College Board Achievement Tests. Scores on College Board Achievement Tests are the basic criteria for placement in French, German, Italian, Spanish, Latin, and mathematics. Course credit is not given for courses bypassed. The following tables will assist students in making reasonable course selections in the subjects indicated.

*The score in English Advanced Placement, although qualifying a student for advanced courses in literature, does not satisfy the requirement in Writing.

†In order to receive credit for Physics 51 or 52, a student must take a validation test during orientation.

French*		German		Italian	
College Board Achievement Scores		College Board Achievement Scores		College Board Achievement Scores	
200-370	French 1-2	200-390	German 1†	200-440	Italian 1-2
380-440	French 12	400-480	German 65-66	450-540	Italian 63
450-540	French 63	490-560	German 63	550-590	Italian 76
550-590	French 76	570 plus	Third year‡	600 plus	Italian 100-level course
600	French 100-level course§				
Spanish*		Latin		Mathematics#	
200-420	Spanish 1-2	200-520	Latin 1†	480	Math. 9-10
430-490	Spanish 12	530-630	Latin 63	490-540	Math. 19
500-570	Spanish 63	640 plus	Third year‡	550-580	Math. 31A
580-620	Spanish 76			590-800	Math. 31 or 33, or with one year of high school calculus, Math. 41
630 plus	Spanish 100-level course§				

*In these languages students are permitted to drop back one level without loss of credit (e.g., from 101 to 76 or from 76 to 63). No credit will be allowed for courses two levels below the achievement score (e.g., students with a score of 640 in French or Spanish could not receive credit for 63, but could for 76). In no case will credit be given for 1-2 to students with three or more years of high school French or Spanish.

†The first year of a language may *not* be taken for credit by a student who has completed more than two years of that language in secondary school. In rare cases, an exception may be granted with permission of the Director of Undergraduate Studies in the appropriate department.

‡An exception may be granted in consultation with the Director of Undergraduate Studies.

§French 111 and Spanish 110 are not open to first semester freshmen with a score of less than 700.

#In the absence of an Achievement Test score, course placement is determined by the SAT score as follows: 490 or below—Math. 9-10; 500-600—Math. 19; 610-650—Math. 31A; 660-800—Math. 31 or 33; 750-800—Math. 31X.

College Board College Placement Tests. Newly admitted students who wish to continue in a language which was begun in high school should be sure to take a College Board Achievement Test in that language by June of the senior year in secondary school. A student who finds that it is not possible to take a foreign language achievement test may petition to take a placement test at Duke University during orientation. In such cases, the student should write to the Coordinator of Placement Testing at Counseling and Psychological Services by July 1, explaining why it is not possible to take the achievement test. Taking the tests under these circumstances is necessary to determine whether the student has demonstrated foreign language proficiency at entrance or, if not, what placement level at Duke is most appropriate to his or her needs. See the statement on the requirement in the section on foreign language in the chapter "Degree Programs."

All freshmen who plan to take mathematics during their first semester at Duke, and who do not submit the College Board SAT score or College Board Achievement Test score in mathematics, must take the College Board College Placement Test in mathematics during orientation. Students who have been placed in Mathematics 9-10, 19, or 31 but believe

that their background in mathematics justifies a higher course placement need not take the College Board College Placement Test, but they should consult the Director of Undergraduate Studies or Supervisor of Freshman Instruction in the Department of Mathematics. Course credit is not given for courses bypassed on the basis of the placement tests.

Placement in Russian. Students who wish to continue in Russian at Duke should see the Director of Undergraduate Studies in the Department of Slavic Languages and Literatures. In the case of Russian, either College Board Achievement Test scores or College Board Placement Test scores serve as criteria for placement. Lacking these, the department offers an examination which is used in conjunction with other criteria for placing students at the appropriate course level.

Reading Out of Introductory Courses. Students demonstrating academic ability may be granted the option of reading out of an introductory or prerequisite course in order to allow them to advance at their own pace to upper level work. No course credit may be earned by reading out. Reading for a course and auditing are mutually exclusive procedures. Students must be recommended for the reading option by their academic deans, and their proposed programs of reading must be approved by the appropriate Director of Undergraduate Studies. Students may be certified for advanced course work by passing a qualifying examination prepared by the department. When an advanced course is completed, an entry is made on the permanent record that the qualifying examination was passed, but no course credit is awarded. Further information is available from the academic deans.

Transfer of Work Elsewhere

Evaluation of Work Taken Elsewhere. For students transferring from another accredited, degree-granting institution, credit for up to seventeen semester courses may be granted (sixteen for those who matriculated prior to May 1, 1988.) Courses in which grades of less than C- have been earned are not accepted for transfer credit; students seeking transfer credit for courses in which they earned a *P* grade must present official verification that the *P* is equivalent to at least a C- grade. The semester-course unit of credit awarded at Duke for satisfactorily completed courses cannot, of course, be directly equated with semester-hour or quarter-hour credits. Ordinarily, transfer students will not be awarded more than four semester-course credits for one semester's work unless they have satisfactorily completed more than the normal course load at the institutions from which they have transferred. All courses approved for transfer are listed on the student's permanent record at Duke, but grades earned are not recorded. Courses taken at other institutions prior to matriculation at Duke are evaluated by the University Registrar and by the faculty.

Limitation on Work Taken Elsewhere. After matriculation as a full-time degree candidate in Trinity College of Arts and Sciences, a student may receive credit toward the Bachelor of Science or Bachelor of Arts degree for a maximum of two courses taken at another institution, whether in the summer while regularly enrolled at Duke, while withdrawn voluntarily from the college, or while on leave of absence (other than for an approved program of study abroad or an approved program at another institution in the United States). Full-time degree candidates in the School of Engineering may receive credit towards the Bachelor of Science in Engineering degree for a maximum of four courses taken at another institution. Ordinarily, no credit will be accepted for course work taken while a student is withdrawn involuntarily. For purposes of this regulation, advanced placement credit is not considered as work taken at another institution. The provision of the residence requirement which allows a student to take the final courses elsewhere remains in effect. See the section on residence requirements in the chapter "Degree Programs."

Students may not transfer credit from two-year colleges after completing their sophomore year. At least half the courses submitted toward fulfillment of a student's major field must be taken at Duke, but departments may make exceptions to this rule in special circumstances. No credit is given for work completed by correspondence, and credit for not more than two semester courses is allowed for extension courses.

Approval for Courses Taken Elsewhere. Approval forms for courses to be taken at institutions other than Duke may be obtained from the offices of the academic deans. Students wishing to transfer credit for study at another accredited college while on leave or during the summer must present a catalog of that college to the appropriate dean and Director of Undergraduate Studies and obtain their approval *prior* to taking the courses.

Advising

Students and their advisers confer when necessary, but they should confer at least once before every registration period to review goals, plans for achieving them, and any problems encountered or anticipated. Before declaring a major in Trinity College, students confer with the premajor adviser, the academic dean for premajor students, or the academic dean in the division of their interests. Upon declaring a major, the student is assigned a faculty adviser; the academic dean for that division is also available for consultation. In the School of Engineering, the adviser's signature is necessary for registration and all course changes. Much good advising is informal and occurs in conversation with members of the faculty. Students have the responsibility to understand and meet the requirements for the curriculum under which they are studying and should seek advice as appropriate.

Registration

Students are expected to register at specified times for each successive term. Prior to registration each student receives special instructions and registration materials. Students prepare a course program, submit it at an appointed time to their advisers for review, and present the approved schedule at registration. In the School of Engineering, the schedule must be signed by the adviser.

Students who expect to obtain certification to teach in secondary schools should consult an adviser in the education program prior to each registration period to ensure that they are meeting requirements for state certification and that they will have places reserved for them in the student teaching program.

Those who register late are subject to a \$50 fine. Students who fail to register for the fall or spring semester are withdrawn and must apply for readmission if they wish to return; they also forfeit their registration deposits unless they indicate at the time of registration their intention not to continue in the University the following term. Those students who have not paid any fees owed to or fines imposed by the University (such as laboratory fees, library fines, and parking fines) by the date specified for registration for the following term will not be permitted to register for the following term until such fees and fines have been paid in full, notwithstanding the fact that the student may have paid in full the tuition for the following term.

Students planning to register for a course under the reciprocal (interinstitutional) agreement must have the course approved by the appropriate Director of Undergraduate Studies and their academic dean. Further information about registration procedures once approval is given may be obtained from the Office of the Registrar. See the chapter "Special Programs" for information regarding the reciprocal agreement with neighboring universities.

Duke Identification Card and Term Enrollment. Students are to report to 103 Allen Building at the beginning of each term to obtain semester validation of their Duke I.D. card. This card should be carried at all times. The identification card with proper validation is means of identification for library privileges, University functions, and services

available to University students. Students are expected to present their card on request to any University official or employee. The card is not transferable, and fraudulent use may result in loss of student privileges or suspension. Loss of the card should be reported immediately to the Office of the Registrar where new ones can be obtained for \$5. Official enrollment is required for admission to any class. Failure to report, or to account beforehand for an absence, entails a loss of registration in courses.

Concurrent Enrollment. A student enrolled at Duke may not enroll concurrently in any other school or college without special permission of the appropriate academic dean. See, however, the statement regarding the reciprocal agreement with the University of North Carolina at Chapel Hill, North Carolina Central University in Durham, and North Carolina State University at Raleigh.

Course Changes after Classes Begin in the Fall and Spring Terms. During the drop/add period changes may be made in course schedules. Receipts for course changes made in 103 Allen Building must be retained.

In Trinity College of Arts and Sciences, students may drop and add courses during the first week of classes in the fall and spring terms at their own discretion; during the second week of the drop/add period they may drop courses at their own discretion, but the signature of the appropriate instructor is required for adding a course. After the drop/add period no course may be added; also, a course may not be changed to or from the pass/fail or audit basis. To withdraw from a course, students must obtain permission from their academic deans, and for reasons of course overload the academic dean may give permission up to midterm. Ordinarily, courses may not be discontinued after midterm. In extraordinary circumstances, however, e.g., for reasons of health, the academic dean may allow a student to withdraw. After the drop/add period, the student receives a WP grade (withdraw passing) or WF (withdraw failing) from the instructor. Course work discontinued without the dean's permission will ordinarily result in a grade of F.

Within the School of Engineering, the signature of the adviser is necessary for dropping or adding courses after classes begin. After the drop/add period no course may be added, and in order to withdraw from a course students must obtain permission from their academic deans. Factors to be considered by the dean include health, necessary outside work, and, up to the time midterm grades are issued, a course overload. Until the last four weeks of classes in the semester, the instructor must certify the student's standing in the course as satisfactory or as failing. In the former case a WP will be entered on the permanent record and in the latter, a WF. During the last four weeks of classes in any semester, or the equivalent in the summer terms, W will be assigned if, in the judgment of the student's dean, compelling and extraordinary circumstances make it necessary for the student to drop the course; otherwise, the course must be continued to the end of the semester. A course discontinued without approval will result in a grade of F.

When students note an error in their course schedules, they should consult with their academic dean.

Course Changes for the Summer Terms. Course changes are accomplished by submitting the three-part drop/add form(s) to the Office of the Summer Session, 121 Allen Building. Beginning May 3, all course changes must be approved by the appropriate academic dean. The Director of the Summer Session serves as the dean for all non-Duke students. Students who are out of town must contact their academic dean directly to arrange for dropping or adding courses.

Courses may be added before or during the first three days of the term (see also the section on late registration and payment). After the third day of the term, no course may be added. Prior to the first day of the term, students may drop a course or courses for which they have registered without penalty. During the first three days of the term, students will be charged \$150 per course (\$75 per half-course) for dropping a course or courses if this results in any reduction in course load for the term. With the permission

of the academic dean a course may be dropped until the end of the fourteenth day of a regular summer term (eleventh day at the Marine Laboratory); the instructor then assigns a *WP* or *WF* grade. Course work discontinued without the approval of the dean will result in a grade of *F*. (See also the section on Withdrawal Charges and Refunds.)

Course Load and Eligibility for Courses

Students are reminded that it is their responsibility to be certain that their course load conforms with academic requirements. The normal and expected course load in the fall or spring term is four semester courses. For students matriculating after May 1, 1988, two additional semester credits are needed in order to meet the thirty-four (34) semester-course requirement for graduation. To take fewer than four or more than five semester courses, students must have the approval of their academic deans. No student, however, may take more than six courses in any semester. With the approval of their academic dean, seniors in Trinity College and the School of Engineering who need fewer than eight semester courses for graduation requirements may take an underload.

Maximum course program for one term of the summer session is two courses, one of which may be a laboratory course. Students in the School of Engineering may enroll in two laboratory courses. In addition, a student may enroll in a physical education activity or dance activity course for one-half course credit.

Self-pacing during a given calendar year (two regular semesters plus two Duke summer terms) is possible with the approval of the student's academic dean and faculty adviser (and in consultation with the Office of Undergraduate Financial Aid, if the student is receiving monetary support from the University). Prior to the beginning of a semester, a student may apply to take fewer than four courses for one or more semesters in a given calendar year after the freshman year, providing the student can meet the continuation requirements described in the chapter "Degree Programs." Advanced placement credits and summer work taken elsewhere are excluded when minimum annual continuation requirements are considered under this plan.

Eligibility for Courses. The rules established by the Graduate School provide that juniors and well-qualified sophomores may enroll in a 200-level (senior-graduate) course if they have obtained written consent of the instructor, as well as that of the Director of Graduate Studies in the department concerned. Undergraduate students may not enroll in 300- or 400-level courses.

Seniors who, at the beginning of the final term, lack no more than three semester courses toward the fulfillment of the requirements for the Bachelor of Arts or Bachelor of Science degree may enroll in graduate courses, for a maximum course load of five semester courses. Admission to the Graduate School is necessary.

Students may not register for two courses meeting at the same time. In Trinity College no course may be repeated for credit or a grade if a C- or higher has been earned previously, except where noted in the course description. A course previously passed, however, may be audited.

Students who receive a *D-*, *D*, or *D+* in any course in Trinity College are allowed to repeat the course at Duke. The grade earned in the repeated course as well as the grade earned originally appear on the transcript, the former identified as a repeat; both grades count in the grade point average, but the credit for only one counts toward the required number of courses for continuation and the thirty-four (34) courses required for graduation.

Course Audit

Students who audit a course submit no daily work and take no examinations. They do not receive credit for the course. With the written consent of the instructor, a full-time degree student is allowed to audit one or more courses in addition to the normal program. Physical education activity, studio art, applied music, and dance activity courses may not be audited. In the fall or spring term, a part-time degree student may audit courses by payment for each course audited. In a summer term, a student carrying two courses for credit may be given permission to audit, without additional fees, nonlabora-

tory courses with the above exceptions. A student in a summer term carrying less than a full program for credit may secure permission to audit (above exceptions apply) but is required to pay half the University fee for the course. After the drop/add period in any term, no student classified as an auditor in a particular course may take the course for credit, and no student taking a course for credit may be reclassified as an auditor. A student may not repeat for credit any course previously audited.

Courses may be audited by faculty members, staff, alumni, employees and their spouses, as well as spouses of currently enrolled students, and members of the Institute for Learning in Retirement; courses audited on the Microelectronics Center of North Carolina (MCNC) Network may be audited without concurrent enrollment in another course. Formal application is not necessary; written permission from the instructor must be obtained and a course card must be signed by the Director of the Office of Continuing Education. Consult the chapter "Financial Information" for the appropriate fee schedule. Auditors must register on the Friday before classes begin.

Independent Study

Independent study enables a student to pursue individual research and reading in a field of special interest under the supervision of a member of the faculty. A student—with the approval of an adviser, the instructor, and the Director of Undergraduate Studies in the instructor's department—may enroll in independent study for any term at Duke. In Trinity College, instructors of independent study courses are expected to meet with the students enrolled at least once every two weeks during the fall or spring and at least once each week during a summer term.

House Courses

House courses, offered in the fall and spring terms, are organized by students within given residential units. They are intended to encourage students to take initiative in creating academic experiences that are not offered by the departments. A house course must be sponsored by a faculty member in the arts and sciences, reviewed by the department of that faculty member, and approved by the Committee on Courses of Instruction of the Undergraduate Faculty Council of Arts and Sciences. House courses carry a half-course credit. In the School of Engineering, house courses cannot be used to meet degree requirements. In Trinity College not more than two semester-course credits earned in house courses may be counted toward the course requirement for graduation. House courses do not count toward other requirements. Grades are submitted only on the pass/fail basis. The academic deans can provide further details.

Submission of Term Paper

Students who wish (under unusual circumstances) to submit a single paper for credit in more than one course must receive prior written permission from each course instructor. The student must indicate the multiple submission on the title page of the paper.

Declaration of Major or Division in Trinity College of Arts and Sciences

Before declaring a major or interdepartmental concentration in Trinity College, students work with their premajor advisers and with other members of the faculty and staff to develop a "long-range academic plan," which outlines academic objectives and plans for meeting goals. The plan should describe the proposed major program, related classroom and outside experiences, and the general pattern of elective courses, as well as the means by which the student will meet established college requirements for graduation.

Freshmen may declare a major in the spring of the freshman year. Freshmen who elect to postpone their declaration of major will not file long-range academic plans during their first year but will be expected to discuss their progress in developing their plans with their advisers during that registration period. All students must secure formal approval of their long-range plans and must declare their major before the last day of classes in their fourth undergraduate semester. Forms for filing the official long-range plan and for registering the initial declaration of major are available in the Premajor Advising Center.

After declaring a major, students are assigned an adviser in the department of the major and an academic dean in the division of concentration. Students who, having already declared a major, wish to change their area of concentration complete a form in the Office of the Registrar and subsequently develop a revised long-range academic plan in consultation with appropriate faculty members in the new major department and, if necessary, with their academic dean. The second major should be declared in the Office of the Registrar before registering for the final term.



A student may declare an interdepartmental concentration after conferring with the Directors of Undergraduate Studies of the departments involved, and they or other advisers assist the student in preparing a program of course work. The program, which must be planned early in the undergraduate career, must consist of at least three courses beyond the introductory level in each of the departments. One of the departments should be identified as primarily responsible for the student's advising. A copy of the plan for the program, with a descriptive title which will appear on the student's permanent record, should be presented, along with the written approval of the Directors of Undergraduate Studies, to the appropriate academic dean. A student who declares an interdepartmental concentration must satisfy all other requirements for Program I.

A student may have a second major recorded on the permanent record; if the student's second major is not offered within the degree to be granted for completion of the first major, a notation of the second major will appear on the transcript. Majors offered within each degree are listed below:

Bachelor of Arts. Afro-American studies, anthropology, art design, art history, biology, botany, Canadian studies, chemistry, classical studies (ancient history and archaeology), comparative area studies, comparative literature, computer science, drama, economics, English, French, geology, Germanic languages and literature, Greek, history, Latin, mathematics, medieval and Renaissance studies, music, philosophy, physics, political science, psychology, public policy studies, religion, Slavic languages and literature, sociology, Spanish, and zoology.

Bachelor of Science. Biology, botany, chemistry, computer science, geology, mathematics, physics, psychology, and zoology.

Changes in Status

Withdrawal and Readmission. Students who wish to withdraw from the college must give official notification to their academic dean. Notification must be received prior to the beginning of classes in any term or tuition will be due on a pro rata basis. (See the section on refunds in the chapter "Financial Information.") For students withdrawing on their own initiative after the beginning of classes and prior to the last four weeks of regular classes in the fall or spring term, or before the last two weeks of regular classes in a summer term, a *W* is assigned in lieu of a regular grade for each course. After these dates an *F* grade is recorded unless withdrawal is caused by an emergency beyond the control of the student, in which case a *W* is assigned by the student's academic dean.

Applications for readmission are made to the appropriate school or college. Each application is reviewed by officers of the school or college to which the student applies, and a decision is made on the basis of the applicant's previous record at Duke, evidence of increasing maturity and discipline, and the degree of success attendant upon activities during the time away from Duke. Students who are readmitted usually cannot be housed on campus.

Applications for readmission must be completed by November 1 for enrollment in the spring, by April 1 for enrollment in the summer, and by July 1 for enrollment in the fall.

Leave of Absence. An upperclassman in good standing may apply in writing to the appropriate academic dean to take a leave of absence for one or two semesters; the deadline for application for a leave is the end of the registration period for the semester immediately preceding the leave. Students returning from approved medical, financial, or study abroad leaves and desiring housing on campus will be placed in the general housing lottery, provided they have submitted the appropriate information to the Office of Student Affairs by the deadline noted above and provided that they lived on campus before taking their approved leave. Those students approved for personal leaves are not guaranteed on-campus housing, but will be given highest priority on the housing waiting list provided the same deadline and qualifications described above have been

met. Unless an exception for an emergency is authorized by the students' academic deans, students applying after the course registration cited above will lose their priorities in University housing for the period following the leave.

Registration materials will be mailed to a student on leave, but final registration is, of course, contingent upon the student's fulfilling the terms of the leave. A student failing to register while on leave will be withdrawn from the University and will have to apply for readmission.

A student who undertakes independent study under Duke supervision and for Duke credit is not on leave of absence even if studying elsewhere. The student registers at Duke as a nonresident student and pays the appropriate fees or tuition at Duke. This also applies to Duke programs conducted away from the Durham campus.

Transfer between Duke University Schools. Students in good standing may be considered for transfer from one Duke undergraduate school or college to another, upon written application and request for a letter of recommendation from their academic dean. The review of requests to transfer involves consideration of a student's general academic standing, citizenship records, and relative standing in the group of students applying for transfer. The school or college to which transfer is sought will give academic counseling to a student as soon as intention to apply for transfer is known, although no commitment will be implied.

A student may apply to transfer at any time prior to or after receiving a baccalaureate degree. A student transferring to Trinity College of Arts and Sciences from the School of Engineering, prior to receiving a baccalaureate degree, may not use more than six professional school credits toward the Bachelor of Arts or Bachelor of Science degree. If admitted after having earned a baccalaureate degree, a student must undertake prescribed additional undergraduate work to qualify for a second baccalaureate degree.

Full-Time and Part-Time Degree Status. Ordinarily candidates for degrees are expected to enroll for a normal course load each semester. Students who need to change from full-time to part-time status must request permission from their academic dean before the end of the preregistration period for the semester for which part-time enrollment is sought. Except for extraordinary circumstances, such permission is given only to students for the final semester of their second year. Part-time students may register for not more than two courses (or two courses and a half-credit physical activity or dance activity course). Part-time students may not live in the residence halls.

Resident and Nonresident status. See the chapter "Campus Life and Activities."

Nondegree to Degree Status. A nondegree student must apply to the Office of Undergraduate Admissions for admission to degree candidacy.

Class Attendance, Excused Absences, and Tests

Responsibility for class attendance rests with the individual student, and since regular and punctual class attendance is expected, the student must accept the consequences of failure to attend. Instructors may refer to the student's academic dean a student who is, in their opinion, absent excessively. As a rule, absences from required classes and tests are excused only for illnesses certified by a medical official of the University or for authorized representation of the University in out-of-town events. Officials in charge of groups representing the University are required to submit the names of students to be excused to the appropriate deans' offices forty-eight hours before absences are to begin.

Class times are officially scheduled at registration unless designated "to be arranged" (TBA). No class time may be changed without prior permission of the University Schedule Committee. Within-class tests (except for the final) are to be given at the regular class meeting times. Exceptions are made for block tests that have been approved by the University Schedule Committee. Hours set up for block examinations are 7:30 to 8:45 A.M., on Tuesdays and Thursdays.

Incomplete Course Work

If because of illness, emergency, or reasonable cause a student cannot complete work for a course, the student may request in writing to his or her academic dean the assignment of an *I* (incomplete) for the course. If the request is approved by the instructor in the course and by the student's academic dean, then the student must satisfactorily complete the work prior to the last class day of the fifth week of the subsequent semester or a grade of *F* will be recorded for the course. An *I* taken in the fall semester must be resolved in the succeeding spring term; an *I* taken in the spring or summer must be completed in the following fall term. A student not enrolled in the University during that subsequent semester will have until the end of the fifth week of the next semester of matriculation to clear the *I*. An *I*, once recorded, will remain permanently on the student's record, even after the final grade is subsequently assigned for the course. If a student whose work is incomplete is also absent from the final examination, an *X* is assigned for the course. Students may not complete work in a course after graduation. For a discussion of the possible impact of an *I* grade on continuation, see the sections on satisfactory performance each term in the chapter "Degree Programs."

Final Examinations and Excused Absences

The times and places of final examinations for the fall and spring terms are officially scheduled by the University Schedule Committee, generally according to the day and hour of the regular course meeting; changes may not be made in the schedule without the approval of the committee. If a final examination is to be given in a course, it will be given at the officially scheduled time. Take-home examinations are due at the regularly scheduled hour of an examination, based on the time period of the class. In fall or spring courses where final examinations are not scheduled, hour examinations may not be given in the last week of classes. In the summer session, final examinations are held on the last two days of each term as specified in the summer session brochure calendar. Final examinations for short courses are held on the last day of the course.

No later than the end of the first week of classes of the fall and spring term, the instructor is required to announce plans for the final examination exercise. Unless departmental policy stipulates otherwise, the form of the final exercise is determined by the instructor. However, a final written examination may not exceed three hours in length and a final take-home examination may not require more than three hours in the actual writing.

If a student is absent from a final examination, an *X* is given instead of a final grade. *An acceptable explanation for the absence must be presented to the appropriate academic dean within forty-eight hours after the scheduled time of the examination, or the X is converted to an F.* If the absence is excused by an academic dean, the student arranges with the dean and the instructor for a make-up examination to be given at the earliest possible time. An excused *X* not cleared by the end of the fifth week of the following semester is converted to an *F*. A student not enrolled in the University during that following semester has until the end of the fifth week of the next semester of enrollment to clear the *X* unless an earlier deadline has been established by the instructor and the academic dean.

Grading and Grade Requirements

Final grades on academic work are sent to students after the examinations at the end of each term. Midterm advisory grade reports for freshmen are issued in the fall and spring.

Passing Grades. Passing grades are *A*, exceptional; *B*, superior; *C*, satisfactory; *P*, passing (see pass/fail option below); and *D*, low pass. These grades may be modified by a plus or minus. A *Z* may be assigned for the satisfactory completion of the first term of a two-course sequence, and the final grade for both courses is assigned at the end of the second course of the sequence.

Although the *D* grade represents low pass, in Trinity College not more than two courses passed with *D* grades may be counted among those required for year-to-year continuation or among the thirty-two courses required for graduation. Courses for which a *D* grade is earned, however, satisfy other requirements. For information on repeating a course with a *D* grade, see the section on course load and eligibility for courses in the chapter.

Failing Grades. A grade of *F* or *U* (see pass/fail option below) indicates that the student has failed the course. The grade is recorded on the student's record. If the student registers for the course again, a second entry of the course and the new grade earned are made on the record, but the first entry is not removed.

Pass/Fail Option. With the consent of the instructor and faculty adviser, a student who has declared a major may register for grading on a pass/fail basis in one elective, nonmajor course each term. No degree requirements, except the requirement for thirty-four course credits and the continuation requirements, may be met by a course passed under the pass/fail option, unless the course is offered only on that basis. Preceptorials, discussion sections, seminars, and tutorials may not be taken on the pass/fail basis, unless the course is offered only on that basis.

After the drop/add period in any term, no changes from pass/fail to regular status, or from regular to pass/fail status, are permitted in any course. A *P* may not be converted subsequently to a regular letter grade, and the course may not be retaken under the regular grading system.

Grades When Absent from Final Examination. See the section on final examination and excused absences in this chapter.

Grades for Incompleted Work. See the section on incompleted work in this chapter.

WP, WF, and W Grades, and WE Designation. *WP* and *WF* grades may be issued if a student withdraws from a course after the drop/add period. (See the sections on course changes in this chapter.) *W* grades are issued if a student withdraws from the University before the last four weeks of regular classes in the fall or spring semester, or before the last two weeks of classes in a regular summer term. (See the section on withdrawal and readmission in this chapter.)

WE indicates correction of an error in registration. It is not a grade.

Academic Recognition and Honors

In determining a student's eligibility for annual recognition and graduation honors, the colleges consider only grades earned in Duke courses, including courses taken in the University's own study abroad programs and under the interinstitutional agreement.

Annual Recognition. In acknowledgment of high academic achievement, recognition is given each summer to freshmen, sophomores, juniors, and seniors if the following requirements are met:

1. A normal academic load has been carried in the fall and spring terms.
2. Grades other than *P* have been earned in six semester courses.
3. No incomplete or failing grade has been received during the fall and spring terms.

The *Dean's List* recognizes students who earn a 3.3 average on all work in both the fall and spring terms. The *Dean's List with Distinction* includes students who earn a 3.6 average on all work in both the fall and spring terms of an academic year.

Graduation Recognition. Academic excellence at graduation has been recognized at Duke at the departmental level by graduation with distinction in a disciplinary or interdisciplinary program and at the college level by Latin honors. These traditional forms of recognition continue. For students who enter Duke as freshmen in the summer or fall

of 1988, a third form of recognition is available which combines features of both graduation with distinction and Latin honors—the honors project.

Graduation with Distinction. Academic departments and interdisciplinary programs of the colleges have programs leading to graduation with distinction. While these programs may vary in specific details, all have common basic features and all have been approved by the Honors Committee of the Undergraduate Faculty Council. To be eligible to begin a program leading to graduation with distinction, a student must show promise of achieving by the time of graduation at least a *B* average in the major field. In addition, departments may have special requirements regarding standards of performance. In the School of Engineering, for example, some departments require at least a *B* average in all subjects and may have other requirements.

Departments or interdepartmental honors committees may invite a student at the end of the sophomore or junior year to enter the Graduation with Distinction Program. The student typically participates in a seminar in the junior or senior year and/or a directed course of reading, laboratory research, or other independent study. The student must eventually present the results of individual research and study in a piece of writing judged by a departmental committee to be distinguished. The student's achievement, including the paper, is assessed by a faculty committee, and if the student has at least a *B* average in the major field, the committee may recommend that the student be graduated with distinction in the major field. A student engaged in an interdisciplinary program, including Program II, must attain an overall *B* average for courses taken in the departmental area of concentration or special study; achievement is assessed by an interdepartmental honors committee established by the Directors of Undergraduate Studies in the departments concerned. A student may also be graduated with distinction in a program of studies that does not offer a major. In such a program the student must present a *B+* grade point average in the program field and a *B* average in all subjects. The papers of students in special programs will be evaluated by a committee drawn from the faculty within those programs. Interested students should consult appropriate Directors of Undergraduate Studies or Program Directors.

Latin Honors by Overall Academic Record. Overall academic excellence over the entire college career traditionally has been recognized by the designations *cum laude*, *magna cum laude*, and *summa cum laude*. At Duke students who earn the following averages for approved course work are graduated with honors: 3.4, *cum laude*; 3.7, *magna cum laude*; 3.9, *summa cum laude*.

Latin Honors by Honors Project. Latin honors may also be awarded by Trinity College to students who successfully complete an honors project in an individual department. Honors projects must be approved by departmental faculty at successive stages during a student's junior and senior years. A candidate for Trinity College honors by honors project must have an overall grade point average of 3.3 at the beginning and end of the project to qualify for departmental nomination. Departmental procedures governing honors projects and the nomination of students for Latin honors by honors project must be approved in advance by the Honors Committee of the Undergraduate Faculty Council.

Other Honors. Elections to the freshman honorary society, Phi Eta Sigma, are made at the end of the fall and spring semesters. Freshmen who earn a 3.5 average in four or more semester courses in their first semester of enrollment, or those whose cumulative average at the end of their second Duke semester is 3.5 or above in a program of eight or more semester courses, are invited to membership.

Elections of undergraduate students in Trinity College and the School of Engineering to membership in the national honor society, Phi Beta Kappa, are held in the spring and fall. A review of the academic record of all prospective candidates is conducted in the junior and senior years as well as in the term following graduation. (Doctoral students, on the other hand, are nominated by their department.) Eligibility for election is determined not by the University, but by the local chapter of the society. No less than four-fifths of earned credits must have been taken on the regular grading system (A-F).

The total number of persons elected annually is limited by bylaw to 10 percent of the graduating class. Inquiries concerning distribution requirements for students in the School of Engineering should be directed to Professor Rhett George, Department of Electrical Engineering. All other inquiries may be directed to the Secretary of Phi Beta Kappa, Box 4795, Duke Station, Durham, North Carolina 27706.

Elections to the national engineering honor society, Tau Beta Pi, are held in the fall and spring. Eligibility is determined on the basis of distinguished scholarship and exemplary character. Engineering students whose academic standing is in the upper eighth of the junior class or the upper fifth of the senior class have earned consideration by their local chapter. Inquiries may be directed to: Advisory Board, Tau Beta Pi, School of Engineering, Duke University, Durham, North Carolina 27706.

International Fellowships. Students interested in various prestigious fellowships for graduate study (for example, the Fulbright-Hays, Luce, Marshall, Rhodes, and Winston Churchill) should consult the academic dean in charge of fellowships, 2022 Campus Drive. Specific information about deadlines and procedures is available through that office.

Notification of Intention to Graduate

The Diploma Card for students in Trinity College of Arts and Sciences and the School of Engineering is official notification that they expect to have completed all requirements for the degree and to receive the diploma on a particular graduation date. It is the responsibility of students to file the card on or before established deadlines. For students in Trinity College, the cards, to be filed during the fall registration period, are available in the College Recorder's office; in the School of Engineering, the Dean's office.

Commencement

Graduation exercises are held once a year in May when degrees are conferred upon and diplomas are issued to those who have completed degree requirements by the end of the spring term. Those who complete the requirements by the end of the summer term or by the end of the fall term receive diplomas dated September 1 or December 30, respectively. There is a delay of one month to two months in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Prizes and Awards

The achievements of undergraduate students are recognized in various fields of activity. The following prizes suggest the range of recognition.

The Robert E. Lee Prize. This prize was initiated by the late Reverend A. W. Plyler, of the Class of 1892, and Mrs. Plyler and continued through the generosity of Mrs. Richard B. Maxwell, Jr., of the Class of 1942. The sum of \$50 is awarded annually at commencement to the person in the senior class of Trinity College of Arts and Sciences or the School of Engineering who, in character and conduct, scholarship, athletic achievement, and capacity for leadership, has personified most nearly the standards of the ideal student.

Julia Dale Prize in Mathematics. This is an annual prize of at least \$100. The winner is selected by the Department of Mathematics on the basis of excellence in mathematics. In some years first and second prizes are given.

The Henry Schuman Music Prize. A prize of \$350 is awarded annually to an undergraduate of Duke University for an original composition or a distinguished paper in music history or analysis. The award is sponsored by the Department of Music through a continuing gift from Dr. and Mrs. James H. Semans, who named the prize after Henry Schuman, a lifelong friend of the Semans and Trent families, a talented amateur violinist, and one who helped to build valued collections in the Duke library.

The William Schuman Prize for Excellence in the Performance of Contemporary Music. An annual prize of \$100 is awarded by Professor Stephen Jaffe of the Department of Music to an undergraduate who has demonstrated superior musicianship in the performance of a twentieth-century musical work (written after 1910). This prize was initiated in 1985 to honor the distinguished American composer William Schuman on his seventy-fifth birthday.

The Edward H. Benenson Awards. These awards of up to \$4,000 each will be given annually to undergraduates with an interest in art, music, drama, or creative writing to broaden students' educational and professional objectives. Those interested should consult the Chairman of their major department.

The Louis Sudler Prize in the Arts. Awards are presented annually by the Institute of the Arts to graduating seniors who, in the opinion of a special institute committee, have demonstrated outstanding achievement in artistic performance or creation. The prize of \$1,000 was established in 1983 through the generosity of Louis C. Sudler, Chicago, Illinois. In some years first and second prizes are given.

The Beth Gotham Semans Drama Scholarships. These awards are made annually to currently enrolled undergraduate students who have been and continue to be active in drama, with preference given to black and other minority students. Applicants need not be drama majors but must demonstrate significant involvement in dramatic activities. Awards range from \$1,000 to \$2,500; decisions are made by a special committee of the Institute of the Arts.

The Anne Flexner Memorial Award in Creative Writing. This award has been established by the family and friends of Anne Flexner, who was graduated from Duke in 1945. There are three categories: prose fiction (5,000-word limit), poetry (200-line limit), and one-act plays (7,500-word limit). As many as three awards may be given, but no more than one in any category, for the best pieces submitted by Duke undergraduates. The amount of each award will be \$200.

The David Taggart Clark Prize in Classical Studies. This prize of up to \$500 derives from income earned on the generous bequest (1956) of Professor David Taggart Clark, classicist and economist. It is awarded to the senior major in Greek, Latin, or Classical Studies who is judged to have written the best honors essay of the year.

CRC Outstanding Freshman Chemistry Award. A copy of the Chemical Rubber Company's *Handbook of Chemistry and Physics* is awarded annually to a freshman student in general chemistry. The basis for selection by a faculty committee is academic excellence.

American Chemical Society Undergraduate Award in Analytical Chemistry. This prize is given annually by the Analytical Division of the American Chemical Society to an undergraduate student in analytical chemistry. The basis for selection is academic excellence and laboratory proficiency. The prize is a subscription to the journal *Analytical Chemistry* published by the American Chemical Society.

The Phi Lambda Upsilon Prize. Phi Lambda Upsilon, the honorary chemical society, annually awards a prize to the junior Bachelor of Science and senior Bachelor of Science majors having the highest overall academic averages. The prize is a one-year membership in the American Chemical Society. The recipients' names are inscribed on a plaque displayed in the Chemistry Library.

North Carolina Institute of Chemists Award. This prize is awarded annually to a graduating senior who has demonstrated a record of leadership and scholastic achievement and who has shown potential for advancement of the chemical and chemical engineering profession.

The Chemistry Department Award. This prize is awarded annually to an outstanding senior chemistry major in the Bachelor of Science degree program. The basis for selection is the student's independent research and interest in pursuing advanced work in chemistry. The prize is a one-year subscription to an appropriate journal.

The Merck Index Award. This prize is awarded annually to one or more graduating chemistry majors intending to pursue a career in medicine. Selection, by a faculty committee, is based on scholastic excellence. The prize consists of a copy of the Merck Index presented by Merck and Co., Inc.

The James B. Rast Memorial Award in Comparative Anatomy. The parents of James Brailsford Rast, a member of the Class of 1958 of Duke University, endowed this award in his memory. The award, consisting of the *Atlas of Descriptive Human Anatomy* by Sobotta and bearing the James B. Rast Memorial bookplate, is given annually to the student who demonstrates the greatest achievement in the study of comparative anatomy.

The Winfred Quinton Holton Prize in Primary Education. This prize was established in 1922 by gifts of Holton Holton, Class of 1907, and Lela Young Holton, Class of 1907, in memory of their son, Winfred Quinton Holton, with the income to be used to provide a prize for investigative work in primary education. This prize may be made annually. Competition is open to Duke seniors and graduate students who are eligible to obtain certification to teach. A student who wishes to be considered for the prize must submit a paper to be judged by a faculty committee in the Education Program.

The William Senhauser Prize. Given by the mother of William Senhauser in memory of her son, a member of the Class of 1942, who gave his life in the Pacific theater of war on August 4, 1944. This award is made annually to the student in Trinity College of Arts and Sciences or the School of Engineering who has made the greatest contribution to the University through participation and leadership in intramural sports. The winner of this prize is chosen by a committee appointed by the President of the University.

The Roger Alan Opel Memorial Scholarship. A grant is awarded annually to a Duke student who will spend a year of undergraduate study at a British university. The student is selected on the basis of intellectual curiosity, academic ability, and financial need. The award was established by the parents of Roger Alan Opel, a senior at Duke University who was killed in November, 1971.

The William T. Laprade Prize in History. This prize is offered in honor of William T. Laprade, who was a member of the Department of History at Trinity College and Duke University from 1909 to 1953, and Chairman of the department from 1938 to 1952. It is awarded to a senior who is being graduated with distinction and whose senior essay in history has been judged to be unusually meritorious.

The Edward C. Horn Memorial Prize for Excellence in Zoology. Given each year to the graduating zoology major who has shown, in the opinion of the zoology faculty, the highest level of academic achievement and promise, this prize is offered in memory of Professor Edward C. Horn. It is a tribute to his warm regard for students and faculty and his appreciation of scholarly excellence. The prize consists of books appropriate to the student's field of interest.

Alona E. Evans Prize in International Law. An annual award to an undergraduate and/or graduate student in arts and sciences whose paper(s) on international law reflect(s) excellence in scholarship. Prizes of not more than \$250 each are derived from income earned on the generous bequest of Professor Alona E. Evans, A.B. '40, Ph.D. (political science) '45.

Robert S. Rankin Political Science Award. An annual award of \$100 is given to the most outstanding student in the field of American government and constitutional law. The funds are donated in memory of Professor Rankin by Judge Jerry B. Stone, A.B. '44, J.D. '48.

Elizabeth G. Verville Political Science Award. An annual award of \$100 is contributed by Elizabeth G. Verville for the best paper in political science submitted by an undergraduate.

Proctor and Gamble Political Science Award. An annual award of \$100, made possible through a grant from the Proctor and Gamble Corporation, is awarded to the graduating senior political science major who has the highest overall grade point average.

The Karl E. Zener Award for Outstanding Performance of a Major in Psychology. The Karl E. Zener Award is given to a psychology major who has shown outstanding performance and scholarship. The award, based on the student's total grade record and a paper submitted to the award committee, consists of a monetary prize and inclusion by name on a memorial plaque in Zener Auditorium.

The Richard L. Predmore Award in Spanish. Given each year to an outstanding Spanish major in honor of Richard L. Predmore, Professor of Spanish at Duke University from 1950-1978 and Dean of the Graduate School from 1962-1969.

The Robert J. Niess Award in French. Given each year to an outstanding French major in honor of Robert J. Niess, Professor of French at Duke University from 1972 to 1981.

The Walter J. Seeley Scholastic Award. This award is presented annually by the Engineers' Student Government to that member of the graduating class of the school who has achieved the highest scholastic average in all subjects, and who has shown diligence in pursuit of an engineering education. The award was initiated to honor the spirit of academic excellence and professional diligence demonstrated by the late Dean Emeritus Walter J. Seeley. It is hoped that this award will serve as a symbol of the man and the ideals for which he stood. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The American Society of Civil Engineers Prize. The prize is awarded annually by the North Carolina Chapter of the American Society of Civil Engineers to two outstanding civil engineering seniors, upon recommendation of the faculty of the civil engineering department. The basis for selection is the student's scholastic record, contribution to the student chapter, and participation in other college activities and organizations. The prize consists of a certificate of award and the payment of one year's dues in the American Society of Civil Engineers.

The George Sherrerd III Memorial Award in Electrical Engineering. This award is presented annually to the senior in electrical engineering who, in the opinion of the electrical engineering faculty, has attained the highest level of scholastic achievement in all subjects and has rendered significant service to the School of Engineering and the University at large. The award was established in 1958 by the parents of George Sherrerd III, a graduate of the Class of 1955, to recognize outstanding undergraduate scholarship. Recipients receive a monetary award, and their names are inscribed on a plaque displayed in the Engineering Building.

The Charles Ernest Seager Memorial Award. This award recognizes outstanding achievement in the annual Student Prize Paper Contest of the Duke branch of the Institute of Electrical and Electronics Engineers or significant contributions to electrical engineering. The award, established in 1958 by the widow and friends of Charles Ernest Seager, a graduate of the Class of 1955, consists of inscribing the name of the contest winner on a plaque displayed in the Engineering Building.

The Milmow Prize. This prize is awarded annually to students from North or South Carolina graduating in the Department of Electrical Engineering, who, in the opinion of the faculty of that department, and, as shown by their grades, have made the most progress in electrical engineering during the last year in school. The prize consists of a certificate of award and one year's payment of dues in the Institute of Electrical and Electronics Engineers for the membership year in which the honoree is awarded the baccalaureate degree.

The Raymond C. Gaugler Award in Materials Science and Engineering. This award is presented annually to the senior who has made the most progress at Duke in developing competence in materials science or materials engineering. The basis for selection is the student's scholastic record, research, or design projects completed at Duke, and interest in a materials-related career. The award has been established by Patricia S. Pearsall in memory of her grandfather, Raymond C. Gaugler, who was President of the American Cyanamid Company prior to his death in 1952.

The American Society of Mechanical Engineers Award. This award is presented annually to a senior in mechanical engineering for outstanding efforts and accomplishments in behalf of the American Society of Mechanical Engineers Student Section at Duke. The award consists of a certificate of recognition.

The School of Engineering Student Service Award. This award, established in 1978, is given to those graduating seniors who, by their contributions of time, effort, and spirit, have significantly benefited the community of the School of Engineering. The names of the recipients are inscribed on a plaque displayed in the Engineering Building.

The T.C. Heyward Scholarship Award. This award is presented annually to an outstanding senior in mechanical engineering at Duke University. The recipient is chosen by a committee of the mechanical engineering faculty and selection is based on academic excellence, engineering ability, and leadership. The recipient receives a monetary award and his or her name is inscribed on a plaque displayed in the Engineering Building.

The William Brewster Snow Award in Environmental Engineering. This award is presented to an outstanding senior in civil engineering who, through superior academic achievement and extracurricular activities, has demonstrated interest and commitment to environmental engineering as a career. Selection of the recipient is made by the civil engineering faculty. The recipient is presented with an inscribed plaque and his or her name is also inscribed on a plaque permanently displayed in the Engineering Building.

The Otto Meier, Jr. Tau Beta Pi Award. This award was established in recognition of Dr. Meier's leadership in establishing the North Carolina Gamma Chapter in 1948 and his continuous service as chapter adviser until 1975. This award is given annually to the graduating Tau Beta Pi member who symbolizes best the distinguished scholarship and exemplary character required for membership. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

The da Vinci Award. This award is presented by a faculty committee of the Department of Biomedical Engineering to the biomedical engineering senior with the most outstanding academic record. This award commemorates the contributions of Leonardo da Vinci in laying the foundations for the study of biomechanics.

The von Helmholtz Award. This award is presented by a faculty committee of the Department of Biomedical Engineering to the biomedical engineering senior who has made the most outstanding contribution to the department. This award commemorates the work of von Helmholtz in laying the foundations of biomedical engineering.

Aubrey E. Palmer Award. This award, established in 1980, is presented annually by the faculty of the Department of Civil and Environmental Engineering to a civil engineering senior in recognition of outstanding academic achievement. The award consists of a certificate of recognition and the name of the recipient inscribed on a plaque displayed in the Engineering Building.

American Society of Heating, Refrigerating, and Air-Conditioning Engineers Outstanding Achievement Award. This award is presented annually by the Triangle Chapter of ASHRAE to two seniors in mechanical engineering. Selection is based on evidence of scholarly contribution in the HVAC field such as a distinctive project or outstanding term paper. The award consists of a United States savings bond presented to each student.

The Mechanical Engineering and Materials Science Faculty Award. This award is presented annually in recognition of academic excellence to the graduating mechanical engineering senior who has attained the highest level of scholastic achievement in all subjects. The name of the recipient is inscribed on a plaque displayed in the Engineering Building.

Education Records

Duke University adheres to a policy permitting students access to their education records and certain confidential financial information. Students may request review of any information which is contained in their education records and may, using appropriate procedures, challenge the content of these records. An explanation of the complete policy on education records may be obtained from the Registrar's office.

No information, except directory information (see below), contained in any student records is released to persons outside the University or to unauthorized persons on the campus, without the written consent of the student. It is the responsibility of the student to provide the Office of the Registrar and other University offices, as appropriate, with the necessary specific authorization and consent.

Directory information includes name, addresses, telephone listing, date and place of birth, photograph, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and most recent previous educational institution attended. This information may be released to appear in public documents and may otherwise be disclosed without student consent unless a written request not to release this information is filed in the Office of the Registrar by the end of the first week of classes each term.

*Special Study Centers, Programs,
and Opportunities*



Campus Centers and Institutes

CENTER FOR INTERNATIONAL STUDIES

The University's Center for International Studies coordinates and supports a wide array of research and teaching activities on international issues in Arts and Sciences and the professional schools. Faculty associated with the center come from diverse disciplines and reflect a wide range of intellectual interests. Their primary bond is a concern with peoples, events, movements, and institutions outside the United States; relations among nations; and activities and institutions in the United States that affect the rest of the world. These faculty share the belief that many, if not most, matters of importance occurring within the United States have significant effects abroad and that important activities that take place abroad frequently affect this country. They agree that the awareness of relationships among peoples, events, cultures, movements, institutions, and processes are essential for an appreciation of the world in which we live and deserve primary emphasis in teaching and research in the University.

The functions of the center are to provide focus, structure, and support to the research efforts of associated scholars and to serve as a catalyst for the coordination of varied research undertakings. It also assists in dissemination of these undertakings and fosters international activities in educational, research, and governmental institutions in the southeastern United States.

The Center for International Studies is involved in monitoring and initiating change in the international curricula of the undergraduate, graduate, and professional schools of the University. It has a special interest in undergraduate education and, through a variety of programs and activities, makes a contribution to the undergraduate academic experience. It seeks to attract students to the wide range of international and comparative courses available and administers the major of the Program in Comparative Area Studies, where students can concentrate on Africa, East Asia, Latin America, the Middle East, Russia and Eastern Europe, South Asia, Canada, or Western Europe. (See the chapter "Courses of Instruction.") All students are encouraged to pursue study abroad opportunities as well as language study in non-Western and Western languages.

Courses in languages and literatures are offered under the center's auspices and are listed under Asian and African Languages, Comparative Literature, Interdisciplinary Courses, Linguistics, and the regular language departments. Instructors for these courses include Miriam Cooke, Ariel Dorfman, Edward Fowler, Richard Kunst, Yasumi Kuriya, Noriko Nagai, Jing Wang, and Susan Willis.

The center also works toward establishing a closer relationship between foreign students and those interested in international studies (see the section on International House in the chapter "Campus Life and Activities").

Area studies function in centers, institutes, or programs in the following areas:

African Studies. This program brings together faculty with a common interest in problems of the African continent. It encourages course work and lectures in African studies. Associated faculty work closely with students concentrating on Africa in the major in comparative area studies.

Asian-Pacific Studies. This program, administered by the Asian-Pacific Studies Institute, supports and encourages Asian and Pacific studies with special emphasis on Japan and China. Courses offered cover a range of disciplines including Japanese, Chinese, Korean, anthropology, economics, art, history, political science, music, and religion. The institute provides support for visiting lecturers and conferences and makes available a limited number of fellowships annually. Study abroad opportunities are available in China and Japan. An East Asia concentration is possible for majors in comparative area studies.

Canadian Studies. The Canadian Studies Center administers the Canadian Studies Program, which offers courses introducing students to various aspects of Canadian life and culture. Courses and lectures in a wide range of disciplines in the humanities and the social sciences are designed to increase students' knowledge and understanding of Canada. Special emphasis is placed on Canadian problems and comparisons of Canadian and American perspectives. Concentrations in Canadian studies are described in the chapter "Courses of Instruction." Study abroad opportunities are available.

South Asian Studies. The South Asian Program combines scholars from Arts and Sciences and the professional schools whose research deals with the societies and cultures of the Indian subcontinent. The program offers courses in Hindi-Urdu, an introductory course on the civilizations of the Indian subcontinent, and topical courses presenting a wide-ranging view of the past and present of the Indian subcontinent. Majors in comparative area studies may elect a South Asian concentration. The program also helps sponsor cultural events put on by the Duke University South Asian Students Association.

Islamic and Arabian Development Studies. The Center for Islamic and Arabian Development Studies, established in 1977 and assisted by grants from the government of Saudi Arabia and American corporations, administers this program. Students majoring in comparative area studies can concentrate in the Middle East, choosing from courses in Arabic, anthropology, history, literature, political science, and religion. The center provides financial support for outside lecturers in an interdisciplinary Islamic civilization course, a survey course on contemporary Arab affairs, and a senior-graduate seminar in comparative development problems in the Islamic world. The center also presents an outreach program to colleges and universities in the Southeast, conducts international conferences, supports lecturers, and has offered a summer program for college teachers.

Latin American Studies. The Council on Latin American Studies administers a comprehensive program in Latin American studies. A wide range of courses in the humanities, the social sciences, Portuguese, and Spanish is offered. Visiting professors and lecturers from Latin America, graduate fellowships, conferences, and summer programs abroad are supported by the program. Faculty associated with the program work closely with students majoring in comparative area studies who concentrate in Latin America.

Caribbean Studies. The Caribbean studies committee focuses its activities on the problems and issues common to the various societies in this culturally diverse region. The committee views the Caribbean region as an ideal laboratory for analysis of issues such as colonialism, race relations, and development problems. The program works closely with the Council on Latin American Studies to serve the needs of students with an interest in this area.

Western Europe and the Advanced Industrial Democracies. This program combines the talents of experts in Western Europe, Japan, and North America in studies investigating problems common to advanced industrial societies. Faculty associated with the program work closely with students concentrating in Western Europe in the major in comparative area studies.

Russian and East European Studies. This program concentrates on Eastern Europe. It encourages proficiency in the Russian language. The faculty work closely with students concentrating on Russia in the major in comparative area studies.

In addition, the Center promotes interdisciplinary research and teaching around thematic issues. These thematic interdisciplinary committees include:

International Advertising and Global Culture. This program focuses attention through its lecture series and the courses offered under its auspices on the relation between advertising and society in both advanced industrial nations and the developing countries of the world.

Comparative Labor Studies. This committee brings together historians, sociologists, political scientists, and other faculty members at Duke with interests in labor and the working class. The committee in particular promotes scholarship and teaching dealing with the comparative study and history of labor in different nations.

Additional information on international studies and the Program in Comparative Area Studies is available from the Center for International Studies, 2122 Campus Drive, Durham, North Carolina 27706.

CENTER FOR RESEARCH ON WOMEN (Duke-UNC Chapel Hill)

The Duke-UNC Center for Research on Women was founded in 1982 as a collaborative endeavor between Duke University and the University of North Carolina (Chapel Hill) to promote women's studies scholarship and research throughout the tri-state area of North Carolina, South Carolina, and Virginia; to support curriculum development in women's studies; and to disseminate women's studies research and information throughout the South. The center principally seeks to explore the intersection of gender, race, and class, with a particular emphasis on the American South and Third World societies.

Its regular activities include a lectureship series, a working paper series, publications, and the sponsorship of conferences, colloquia, and community events. Students seeking information should inquire at 207 East Duke Building (Duke), (919) 684-6641 or at 03 Caldwell Hall 009A (University of North Carolina, Chapel Hill), (919) 966-5787.

CONTINUING EDUCATION

Academic Study. Local adult residents are encouraged to pursue academic study at Duke (1) as provisional degree candidates, for those resuming or beginning a bachelor's degree; (2) as nondegree students, for those seeking a sequence of undergraduate credit courses; and (3) as students completing the last year of work towards a degree at another institution. These students are given academic and career counseling by the Office of Continuing Education. They are subject to most of the regulations set forth for degree candidates. Continuing education applications may be obtained from the Office of Undergraduate Admissions and must be returned to that office, accompanied by a \$35 application fee, by August 1 for the fall semester and by December 1 for the spring semester.

Adult Counseling Services. Adult Counseling Services assists persons making decisions about returning to work, re-entering school, career planning and assessment, life/work transitions, and individual goal setting. Individual appointments, group sessions, and workshops are held.

Short Courses and Conferences. Short courses (noncredit) in the liberal arts are offered regularly throughout the year for those interested in personal enrichment or career advancement. Conferences, institutes, and training programs are conducted during the academic year and in the summer. Some are residential and others are designed for local participants. Some award continuing education units.

The Institute for Learning in Retirement. The institute is for persons over fifty years of age who recognize in themselves a need to continue learning and sharing knowledge.

For brochures on each program and for fuller information, write or call the Office of Continuing Education, The Bishop's House, East Campus, (919) 684-6259.

INSTITUTE OF THE ARTS

The Institute of the Arts coordinates, promotes and develops activities in the performing and creative arts, originates new projects in the arts, sponsors residencies by professional artists, initiates interdisciplinary courses, and works to define and enhance the role of the performing and creative artist in a liberal arts setting. The institute sponsors a one-semester, off-campus residency program, Duke in New York Arts, open to a limited number of juniors and seniors who qualify for and would benefit from an intensive study and internship experience. Students seeking further information on the Institute of the Arts should inquire at the Institute in 109 Bivins Building, (919) 684-6654.

INSTITUTE OF STATISTICS AND DECISION SCIENCES

The Institute of Statistics and Decision Sciences was founded in 1985 to conduct and coordinate teaching and research in statistics and the application of quantitative methods to the study of decision making. The program draws on faculty throughout the University to offer training and consultation in mathematical statistics, statistical modelling, applied statistics, statistical computing, operations research, game theory, decision analysis, and utility theory. Students interested in the activities of the institute should consult the office of the Director of the Institute of Statistics and Decision Sciences, 329C Social Sciences Building, (919) 684-8795.

Programs Not Offering Majors

Through the programs described below, students have the opportunity to engage in the concentrated study of an area not offering a major. These programs, supplements to the basic course of study, usually reach beyond departmental boundaries and generally provide an interdisciplinary focus to the subject matter. If completed, many offer official recognition of participation, often in the form of a certificate. More information may be obtained from the directors of the programs.

FILM AND VIDEO

The Program in Film and Video introduces students to the critical analysis of new communications technologies: film, photography, and television. Practical experience in 16mm film and videotape production is also available through course work and internships. Established in 1986, this program also sponsors speakers, film and television screenings, and exhibits in cooperation with the Center for Documentary Photography, the Institute of the Arts, and the Center for International Studies. For further information, students should consult the program director, 319 Carr Building.

HUMAN DEVELOPMENT

This interdisciplinary program provides opportunities to compare and to explore the complementarity of disciplinary perspectives on the biological, biomedical, psychological, social, and cultural aspects of human development. The program, which is more

fully described under "Courses of Instruction," integrates courses, a research apprenticeship, and special events through an active advisory procedure. For more information and a program brochure, inquire at the University Council on Aging and Human Development, 3502 Gerontology Building, (919) 684-6118.

JUDAIC STUDIES

Duke University through the auspices of the Center for Judaic Studies offers a full range of courses in Judaic civilization. Participating departments and programs include religion, Germanic languages, comparative literature, political science, international studies, anthropology, and women's studies. In addition, courses may be taken at nearby Chapel Hill where additional courses are offered under the rubric of the Joint Program in Judaic Studies. A full range of courses is available in classical and modern Hebrew as well as in Yiddish. Students desirous of further language training or specialization may elect to pursue their studies in Israel during their junior year at a Duke approved program.

The program in Judaic studies is largely focused on undergraduates who may earn a certificate in Judaic studies after taking any four courses, or who may pursue Judaic studies under Program II, the alternative program option. This option offers a student the flexibility to design, with the aid of a faculty advisor, a curriculum to accommodate unusual interests and talents. Some students may also choose to concentrate on Judaic studies within the context of a religion major; such students are also eligible to receive a certificate.

Duke regularly sponsors its own summer program in Israel and over 700 students have participated in it to date. For further information, inquire at the Center for Judaic Studies, P.O. Box 4735, Duke Station, Duke University, Durham, North Carolina 27706.

NEUROSCIENCES

The neurosciences program reflects the rapid developments in our understanding of brain mechanisms and behavior. Undergraduates are offered opportunities to learn about these developments in new and existing courses. The approach to the neurosciences is broad, covering the cellular and subcellular levels (molecular and genetic properties, cell and membrane physiology, neurochemistry), systemic levels (neuroanatomy, sensory and reflex function, brain disorders), and integrative levels (perception, memory, behavioral genetics, evolution of brain and behavior). The program emphasizes breadth in the arts, sciences and humanities, with an understanding of the neurosciences as an integral part of a liberal education. For further information, consult the director, Professor John Staddon, 250 Psychology-Sociology Building.

PERSPECTIVES ON MARXISM AND SOCIETY

Perspectives on Marxism and Society is a program devoted to the study of Marxist theories of society. Courses in the program focus on Marxism, not primarily as a political or ideological system, but as a scholarly methodology incorporating a variety of analytical techniques across a wide range of disciplines. The unifying theme of the program is a critical appraisal of Marxist methods of analysis and their social implications, considered in the light of theoretical alternatives and changing historical circumstances. Courses included in the program cover a wide range of subjects, including sexual and racial inequality, alienation, development and underdevelopment in the world system, labor processes, protest movements, and ideologies.

Students in the program will be required to take a core course in varieties of Marxist analysis. Four more approved courses, no more than three from one department, will complete the program of study. A certificate will be awarded to those who meet the requirements of the program. Students in the program will be expected to major in another discipline, with the program a supplement to their major. Full details concerning the

program and its courses can be obtained by writing or calling the director, Professor Frederic R. Jameson, Graduate Program in Literature and Duke Center for Critical Theory, 302 Carr Building, 684-4127.

PRIMATOLOGY

The primate program provides an interdisciplinary investigation of primate development and evolution from the anatomical, ecological, and behavioral perspectives. Theoretical issues arising from sociobiology and new fossil discoveries will be tested as to their validity when applied to human evolution. The course of study leads from a generalized introduction through more specialized topics to the design and completion of a research project under the guidance of a faculty member. The final step is an oral presentation of the research results in a Senior Seminar. For more information on the Primatology Program call the Anthropology Department at 114 Social Sciences Building, (919) 684-5012.

SCIENCE, TECHNOLOGY, AND HUMAN VALUES

The Program in Science, Technology, and Human Values provides students an opportunity to explore the social and cultural dimensions of science, technology, and medicine. Through course work and a wide variety of extracurricular activities, students are introduced to the perspectives and insights of other disciplines in order to develop a richer and more informed understanding of their own field of specialization. The program brings together students and faculty from the sciences and engineering with their counterparts in the humanities and social sciences, with a heavy emphasis on interdisciplinary study and discussion. Detailed information is given in the chapter "Courses of Instruction" in the Bulletin.

TWENTIETH-CENTURY AMERICA PROGRAM

The Twentieth-Century America Program explores modern American society in a group of interrelated courses from the perspectives of history, literature, sociology, religion, and political thought. The program offers five courses in the fall, of which participants must take at least three. Some twenty-five students are selected for the program; all undergraduates may apply.

This special program provides the student with the opportunities that come from relatively small classes (often of seminar format), a program of interrelated and mutually reinforcing courses, and close relationships with professors and stimulating fellow students.

Courses that the program has offered include University Writing Course (special section), History 92, Sociology 101, Political Science 144S, and Religion 60S (see descriptions in this bulletin). Further information and application forms may be obtained from the director of the program who can be reached through the Premajor Advising Center.

WOMEN'S STUDIES

The Women's Studies Program is a multidisciplinary forum for the study of women's roles and gender differences in various societies, past and present. Established in 1982, it offers courses, lectures, films, programs, and research support and brings together faculty and students from all fields who are concerned with both the theoretical questions stemming from the study of gender in the disciplines as well as the implications of such investigations for women and men in contemporary societies. The program seeks to encourage the use of new scholarship, which in the last two decades has challenged empirical and theoretical understandings of the sexes, from the perspectives of the humanities, the social sciences, and the biological sciences. *Signs: Journal of Women in Culture and Society* is edited in the Office of Women's Studies, providing students with

the opportunity to be involved in the development of the most recent scholarship on women. For more information on Women's Studies, inquire at the Office of Women's Studies at 207 East Duke Building, (919) 684-5683.

RESERVE OFFICER TRAINING CORPS

Duke University and the military services cooperate in offering officer education programs to provide opportunities for students to earn a commission in the United States Air Force, Army, Navy, or Marine Corps. The programs are described below, and detailed information on scholarships, entrance requirements, and commissioning requirements is available from the offices of the Department of Air Force Aerospace Studies, the Department of Military Science (Army), and the Department of Naval Science. Courses offered in these departments are described in the chapter "Courses of Instruction" in this bulletin.

The Air Force Reserve Officer Training Corps (AFROTC). AFROTC selects, trains, and commissions college men and women to serve as officers in the U.S. Air Force. Two AFROTC programs are available, a four-year and a two-year program.

The four-year program consists of the General Military Course (GMC) taken during the freshman and sophomore years and the Professional Officer Course (POC) taken during the junior and senior years. Entry into the GMC is open to all freshmen and sophomores. Entry into the POC is competitive and requires successful completion of a four-week field-training encampment at a selected Air Force base during the summer between the sophomore and junior years.

Students interested in the two-year program should submit applications no later than early spring semester of their sophomore year. Entry into the two-year program is competitive and requires the successful completion of a six-week summer field-training encampment prior to entry.

Cadets may compete for three and one-half-, three-, two and one-half-, and two-year scholarships. All scholarship and POC cadets receive a tax-free stipend of \$100 per month. On graduation, cadets are commissioned as second lieutenants in the Air Force Reserve and are obligated to serve four years of active duty. Direct inquiries to the Department of Aerospace Studies, 304 North Building, (919) 684-3641.

The Army Reserve Officers' Training Corps (AROTC). Army ROTC provides students with an opportunity to earn a commission as a second lieutenant in the U.S. Army, U.S. Army Reserve, or Army National Guard while completing requirements for a baccalaureate degree. Two programs are available, a four-year and a two-year program.

The four-year program consists of the Basic Course (freshman and sophomore years) and the Advanced Course (junior and senior years). Direct entry into the Advanced Course is possible under specific circumstances (two-year program). Students wishing to join the two-year program must confer with the Department of Military Science not later than April 1 of their sophomore year. There is only one mandatory summer training requirement, Advanced Camp, which takes place over a six-week period between the junior and senior years. All uniforms and AROTC texts are provided.

Upon commissioning, the service obligation may be served on active duty, in the Army Reserve, or in the Army National Guard, as directed by the Secretary of the Army. At the beginning of the senior year, cadets submit a preference statement concerning the method by which they wish to fulfill their service obligation and the specialty in which they desire to serve. A request to delay the fulfillment of the service obligation in order to attend graduate or professional schooling is also authorized.

Cadets are encouraged to compete for Army ROTC scholarships which pay full tuition, most fees, a generous textbook and equipment allowance, and \$100 per month for each month in school (up to \$1,000 per year). Nonscholarship Advanced Course cadets also receive the \$100 monthly stipend. All of the above benefits are tax-free. Participants in Advanced Camp are paid one-half of the basic pay of a second lieutenant.

Detailed information is available from the Department of Military Science, 06 West Duke Building, East Campus, (919) 684-5895, or 1-800-222-9184.

The Naval Reserve Officer Training Corps (NROTC). The Department of Naval Science offers students the opportunity to become Naval and Marine officers upon graduation. Selected students may receive up to four years of tuition, fees, uniforms, and textbooks at government expense under the auspices of the Scholarship Program. In addition, scholarship students receive subsistence pay and summer active duty pay of approximately \$1,300 a year. They participate in training courses each summer either aboard ship or at naval shore facilities to augment their academic studies. Four years of active duty service as a Regular Officer is required upon graduation.

Nonscholarship students may be enrolled in the College Program. They take the same courses and wear the same uniform, but attend the University at their own expense. Uniforms and naval science textbooks are provided by the government. During the last two academic years, they are enlisted in the Naval Reserve, receive \$100 per month subsistence pay, and participate in summer training. Three years active duty service as a Reserve Officer is required upon graduation.

College Program students may compete for scholarship status during the freshman or sophomore years through academic performance, demonstrated aptitude for military service, and nomination by the Professor of Naval Science. Students in either program may qualify for a commission in the Marine Corps through the Marine Corps Option Program. Students seeking further information on the NROTC program may call the Department of Naval Science, Hanes House, (919) 684-3841.

Off Campus Opportunities

STUDY ABROAD

A Duke student may earn credit for approved work completed during the academic year at a foreign university or for an approved program abroad sponsored by Duke or by another approved American college or university in the fall, spring, and summer. To receive the maximum amount of study abroad transfer credit at Duke—four course credits for a full semester, eight for a full academic year, two for a summer—a student is expected to take a full, normal course load, as defined by the other institution involved. No additional study abroad transfer credit will be awarded for a course overload. A leave of absence from the University is granted for a semester or academic year of approved study abroad. Duke-administered programs do not involve transfer credit and do not require a leave of absence. Arrangements are made normally for students to register, while abroad, for the term in which they plan to return. Seniors planning to spend their last semester abroad are subject to the residence requirement and may face postponed graduation because transcripts from abroad are often delayed.

Semester and Academic Year Programs

A student who wishes to receive transfer credit for study abroad should take into account the following criteria established by the faculty and administered by the Committee on Study Abroad:

1. a scholastic average of at least a B- (a student lacking this average may petition the academic dean responsible for study abroad if there are unusual circumstances);
2. certification, when applicable, from the foreign language department concerned, that the student has an adequate knowledge of the language of the country in which study is pursued;
3. approval, obtained before leaving Duke, of the appropriate Directors of Undergraduate Studies for the courses to be taken abroad, as well as approval of the program and the courses by the dean responsible for study abroad and by the student's academic dean;

4. permission for leave of absence once program plans are complete.

Duke, at present, offers various programs in cooperation with other universities during the fall and spring terms. Students accepted may study in:

Austria. From time to time Duke sponsors a term program in Vienna for members of the Wind Symphony and other interested students. More information is available from Professor Paul Bryan, Department of Music.

Canada, Montreal. Duke students participating in the Duke/McGill University Exchange Program may spend one semester or academic year at McGill, located in the Quebec city of Montreal. Because the language of instruction at McGill is English, program applicants need not have studied French although some knowledge of it would be advantageous. The program is sponsored by the Canadian Studies Center and Trinity College; information and application forms are available at 2022 Campus Drive.

China. In cooperation with Nanjing University and Beijing Teachers College, Duke conducts a six-month study program in the People's Republic of China in the summer and fall terms. The program includes a fall term at Nanjing University preceded by an intensive language session in Peking. Participants must have at least one year of Chinese language. Information is available from the Asian-Pacific Studies Institute, 2111 Campus Drive, and at 2022 Campus Drive.

Egypt, Cairo. Through an agreement with the American University in Cairo, Duke students may spend a spring semester or academic year there taking regular classes with Egyptian students. They may enroll in general courses in humanities, social sciences, and sciences, as well as in Arabic language and specialized courses in Middle Eastern studies. Applications are available at 2022 Campus Drive.

England, Oxford. Through a special arrangement with several colleges at the University of Oxford, selected Duke students may spend their junior year at Oxford as regularly enrolled visiting students. The students are treated exactly like their British counterparts, and most of them live in college housing. Students may choose to concentrate their study in any one of the major fields in the humanities, social sciences, or selected natural sciences. Each student is assigned a tutor. Applicants must have a very strong academic record; previous course work in the subject to be pursued at Oxford is also required. More information may be obtained from 2022 Campus Drive.

France, Paris. Duke offers a full-year program in Paris in conjunction with the University of Paris-VII in the heart of the Latin Quarter. The language of instruction will be French; one course will be offered by the Resident Director from Duke, and three courses will be taught by the faculty of Paris-VII. Applicants must have completed four semesters of French plus two courses at the 100-level or above with a grade of at least B+. Priority will be given to juniors and full-year applicants, although some participants may be admitted for one semester only. More information may be obtained from 2022 Campus Drive or the Department of Romance Languages, 205 Languages Building.

Germany, West Berlin. Each spring semester and summer term (mid-February-mid-July) Duke offers a special study program at the Free University of West Berlin for students in junior, senior, or post-baccalaureate standing and with an advanced knowledge of German. Students are matriculated as regular students of the Free University and enroll in two intensive German language courses on the advanced level and one special course each in German history and political science, and will earn four regular Duke credits. In addition they audit at least one regular Free University course of their choice. More complete information may be obtained in the Office of the Summer Session, 121 Allen Building.

India, Madras. Duke students may participate in a fall semester program administered by the consortium of the South Atlantic States Association for Asian and African Studies, of which Duke is a member. The program, which is offered in alternate years, offers courses in Indian history and culture, beginning Tamil, and independent research. More information may be obtained at 2022 Campus Drive.

Italy, Rome. As one of the participating members of the Intercollegiate Center for Classical Studies in Rome, Duke University may send classics majors and other students with strong classical interests for admission to a term's work at the center, usually in the junior year. Instruction is offered in Greek, Latin, ancient history, ancient art, and archaeology. Some scholarship help is available. Additional information may be obtained from the Department of Classical Studies, 328 Carr Building.

Japan, Tokyo. Qualified students may be recommended each year by the Asian-Pacific Studies Committee for the junior year exchange program with International Christian University in Tokyo. This small, select university is noted for the international character of its student body (85-90 percent Japanese, 10-15 percent non-Japanese, primarily from other Asian nations and the United States). Courses may be taken in English as well as Japanese. More information is available from the Asian-Pacific Studies Institute, 2111 Campus Drive, and 2022 Campus Drive.

Scotland, Glasgow. The Department of Public Policy Studies offers departmental majors the opportunity to study during the fall semester of their senior year at the University of Glasgow, where, practically speaking, public policy analysis was invented. Students will live on campus and will take the program's special seminar in public policy, in addition to three electives from the general university curriculum. Further information may be obtained from the Director of Undergraduate Studies in the Department of Public Policy Studies, 116D Old Chemistry Building.

Spain. Duke occasionally sponsors a term in Madrid. More information may be obtained from Professor Miguel Garci-Gómez, Department of Romance Languages.

Further information concerning semester and academic year programs, as well as the Oxford Summer Program (described below) and non-Duke summer programs, may be obtained at 2022 Campus Drive. All Trinity College students are responsible for following the procedures and meeting the deadlines set forth in Duke's study abroad booklet, *Opportunities for Undergraduate Study Abroad*, available there. In all cases, the dean of study abroad must be informed in advance about a student's plans.

Duke Summer Programs Abroad

The Office of the Summer Session, in cooperation with several University departments, provides many opportunities for students to study abroad while earning Duke University credit. Information about Duke Summer Programs Abroad and about the time they will next be offered can be obtained from the program directors or the Office of the Summer Session, 121 Allen Building.

Brazil. The Summer Session Office, the Department of History, and the Department of Political Science offer a two-course, six-week program in Rio de Janeiro at IUPERJ, one of the leading institutes of social science research in Latin America. The objectives of the program are to acquaint students with Brazil's history, Brazilian political and social structure, and Brazil's relations with other countries. Students live in an apartment-hotel or with families. For further information inquire at the Summer Session Office, 121 Allen Building.

British Isles, England, Cambridge. The Summer Session Office and the Department of Political Science offer a two-course, six-week program at the University of Cambridge focusing on the comparison of the British and American legal systems. One course will be taught by Professor Peter Fish of Duke, the other by a faculty member of the University of Cambridge. Students live at Emmanuel College, Cambridge University. For further information see Professor Peter Fish, Department of Political Science, 503 Perkins Library.

British Isles, England, Durham. The Summer Session Office and the Department of Religion offer a two-course, six-week program at Hatfield College of the University of Durham on twentieth-century American and British Literature and its religious implications. One course is taught by Professor Wesley Kort of Duke, the other by a faculty

member of the University of Durham. Students live at Hatfield College. For further information see Professor Wesley Kort, Department of Religion, 218 Gray Building.

British Isles, England, London. The Summer Session Office, Duke Drama, and the Department of English offer a two-course, six-week program in London, focusing on the history and analysis of theater, dance, and opera in Britain with study of dramatic texts and their production. One course is taught by Professor John Clum of the Drama Program, the other by a faculty member of the Department of Drama and Theatre Studies of the University of London. Students live in dormitories. For further information see Professor John Clum, Department of English, 304B Allen Building.

British Isles, England, London. The Summer Session Office, the Department of History, and the Department of Civil Engineering offer a two-course, six-week program on the historical, cultural, and technical aspects of the design and execution of selected monuments and structures. This program will be based in London, and students will be housed in dormitories. Excursions are planned to sites which illustrate technological achievements and principles in socio-historical context. For further information see Professor Seymour Mauskopf, Department of History, 237 Allen Building or Professor Henry Petroski, Department of Civil Engineering, 126 Engineering Building.

British Isles, England, Oxford. The Duke/Oxford Summer Program, a six-week session at New College, Oxford, utilizes the Oxford tutorial system of education. The tutorial format is supplemented by the lectures given at the University of Oxford International Graduate Summer School by noted British scholars. Detailed information may be obtained in the Study Abroad Office, 2022 Campus Drive.

British Isles, Ireland, Scotland, England. The Summer Session Office and the Department of Religion offer a two-course program on ethical issues in health and illness in the United States, Ireland, and Great Britain. Lectures by medical personnel are supplemented by site visits to medical facilities and health care agencies. The first two weeks of study are in Dublin, the second two weeks in Edinburgh, and the last two weeks in London. Students live in dormitories. For further information see Professor Thomas McCollough, Department of Religion, 325 Gray Building.

Canada. The Summer Session Office, the Department of History, and the Canadian Studies Program offer a two-course, six-week program beginning in Montreal with an extensive study trip throughout Canada. The objectives of this program are to familiarize students with the historical, political, and social reality of Canada as a bilingual and bicultural society. Students live in dormitories and hotels. For further information see Professor Clark Cahow, 114 Allen Building.

France. The Summer Session Office and the Department of Romance Languages offer a two-course, six-week program in Paris. It provides the opportunity to take Duke courses in the ambience of Paris. One course is in French language; the other is in French literature and culture. Both courses are taught in French. Students live in a hotel. For further information see Professor Alice Kaplan, Department of Romance Languages, 205 Languages Building.

Germany. The Summer Session Office and the Department of Germanic Languages offer two programs at the Friedrich-Alexander Universität at Erlangen, Germany. One program provides an opportunity to study classroom German at different levels while living with a German family and participating in study, day trips, and excursions (May and June). In the other program, advanced students may choose from a variety of FAU courses and remain for a full summer semester (through early August). Semester program students live in dormitories. For further information see Professor Helga Bessent, Department of Germanic Languages, 107 Languages Building.

Greece. The Summer Session Office and the Department of Classical Studies offer a one-course, four-week program in Greece featuring readings, walking lectures, and touring important sites and museums to study the development of the preclassical,

classical, Roman, and Byzantine cultures in Greece. The course is taught by Professor John Younger of Duke. Students live in hotels. For further information inquire at the Summer Session Office, 121 Allen Building.

Israel. The Summer Session Office, the Department of Religion, and the Duke Center for Judaic Studies offer a summer program in Israel—in Jerusalem and Galilee, giving students an opportunity to participate in an archaeological dig and to explore historical and contemporary Israel, as well as western religious traditions. Students live in dormitory-style accommodations. For further information see Professors Carol Meyers or Eric Meyers, Department of Religion, 118 Gray Building.

Italy, Florence. The Summer Session Office, the Department of History, and the Department of Art and Art History offer a two-course, six-week program focusing on Renaissance Florentine history and art. Both courses are taught in English. Students live in a hotel. For further information see Professor John Spencer, Department of Art and Art History, 112 East Duke Building.

Italy, Rome. The Summer Session Office, the Department of Classical Studies, and the Department of Art and Art History offer a double-course, six-week program in Rome and central Italy. Through visits to sites and museums, walking lectures, and readings, the course will examine the history of the city of Rome from the earliest times through the Baroque and modern periods, with emphasis on the transition of Rome from pagan to Christian center. Students live in dormitory-style accommodations. For further information see Professors Peter Burian, Department of Classical Studies, 315 Carr Building or Annabel Wharton, Department of Art and Art History, 112 East Duke Building.

Morocco. The Summer Session Office, the Department of Religion, and the Center for International Studies offer a two-course, six-week program at the University of Marrakesh, and in Asila. One course is on the religion and history of North Africa; the other focuses on North African literature and culture. Students live in hotels. For further information see Professors Miriam Cooke, Center for International Studies, 2111 Campus Drive, or Bruce Lawrence, Department of Religion, 115 Gray Building, or Professor Derryl MacLean, Department of Religion, 118 Gray Building.

The Netherlands, Amsterdam, Learning Disabilities. The Summer Session Office and the Program in Education, in conjunction with the Department of Psychology, offer a two-course, six-week program in Amsterdam on learning disabilities with Professor Lucy Davis of Duke and Professor Dr. Jacob Valk, Department of Neuroradiology of the Free University of Amsterdam. The program is taught in English and is designed primarily for advanced undergraduates, graduate students, and practicing learning disabilities specialists. Amsterdam is a major center for study and treatment of learning disabilities, and the program utilizes guest lecturers from institutions in Amsterdam and elsewhere in the Netherlands. Students live in apartments of the university guesthouse. For further information see Professor Lucy Davis, Program in Education, 213C West Duke Building.

The Netherlands, Amsterdam, Economics. The Summer Session Office and the Department of Economics offer a two-course, six-week program in economics at the City University of Amsterdam focusing on an introduction to economic thinking and the political economy of a pluralist society. Both courses are taught in English. Students live in university facilities. For further information see Professor Neil de Marchi, Department of Economics, 318 Social Sciences Building.

Soviet Union. The Summer Session Office and the Department of Slavic Languages offer a two-course, six-week summer program in Leningrad. Russian language study at different levels will be offered, as well as a course in Russian culture. Extensive excursions to Moscow and other cities are included in this program. Classes in Leningrad are taught in the Russian Language Institute for Foreign Students by faculty members of the Institute. Students live in international hotels. For further information see Professor Stephan Pugh, Department of Slavic Languages, 321C Languages Building.

Spain. The Summer Session Office and the Department of Romance Languages offer a two-course, six-week program at the intermediate and advanced levels in Madrid and Malaga with excursions to Toledo, Segovia, Granada, Sevilla, Cordoba, and Gibraltar. All courses are conducted in Spanish, and students live with Spanish families. For further information see Professor Miguel Garci-Gómez, Department of Romance Languages, 203 Languages Building.

Taiwan. The Summer Session Office and the Departments of Anthropology and Sociology offer a two-course, six-week program at the Academia Sinica in Taipei focusing on modern Chinese society and development issues of East Asia. Students live in dormitories. The program concludes with a three-day excursion to Hong Kong. For further information, see Professor Robert Weller, 2022 Campus Drive.

Zimbabwe/Botswana. The Summer Session Office and the Department of Political Science offer a two-course, six-week program focusing on the politics and development of southern Africa with guest lecturers from the Universities of Zimbabwe and Botswana. The program includes study trips to development projects, and excursions to Victoria Falls and Hwange (Wankie) Game Park. Students live in dormitories. For further information, inquire at the Summer Session, 121 Allen Building.

DUKE UNIVERSITY MARINE LABORATORY

The Duke University Marine Laboratory (DURL) is located adjacent to the historic seacoast town of Beaufort, North Carolina, with direct access to the Atlantic Ocean, Cape Lookout National Seashore Park and the Outer Banks, estuaries, sand beaches and dunes, wetlands, and coastal forests. Because of the richness and diversity of its flora and fauna, the area provides an excellent opportunity for marine biological study. The Marine Laboratory is an interdepartmental teaching and research facility of the University. The departments which are chiefly concerned are biochemistry, botany, chemistry, geology, physiology, and zoology. Academic programs include a spring term and a fall term for undergraduates and three terms of summer school for undergraduate and graduate students as well as a cooperative academic program for students from several colleges and universities. For information concerning application and registration, write to Admissions Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

AGREEMENTS WITH OTHER UNIVERSITIES

Neighboring Universities. Under a plan of cooperation, the interinstitutional agreement among Duke University and the University of North Carolina at Chapel Hill, North Carolina State University at Raleigh, and North Carolina Central University in Durham, a student regularly enrolled in Duke University and paying full fees may enroll for one approved course each semester at one of the institutions in the cooperative program. If the student takes two or more courses during a summer at Duke, one of the courses may be taken at one of the neighboring institutions under this plan. This agreement does not apply to contract programs such as the American Dance Festival.

Approval forms for courses to be taken at these neighboring institutions may be obtained from the offices of the academic deans at Duke. Ordinarily, only those courses not offered at Duke will be approved. Credit so earned is not defined as transfer credit since grades in courses taken under the interinstitutional agreement are entered on the official record and used in determining the quality point ratio. The student pays any special fees required of students at the host institution and provides transportation.

Howard University. Duke students participating in the Duke/Howard University Exchange Program may spend a semester studying at Howard University in Washington, DC, while Howard undergraduates enroll for the same period at Duke. More information about this program, administered by Trinity College, is available at 2022 Campus Drive.

DUKE FUTURES PROGRAMS

Initiated in 1985, Duke Futures Programs offers undergraduates the opportunity to explore a wide range of career interests through participation in summer and academic year internships and jobs. Opportunities are arranged through the Scholar-Intern Program and made available through the general employment and internship listings in the Duke Futures office.

The Scholar-Intern Program provides highly motivated sophomores and juniors with firsthand experience in a field related to their academic program or future career. Internships are paid and are for at least a twelve-week period during the summer. Students apply for this program in the fall prior to the summer in which they wish to work. Positions are developed by a network of alumni volunteers located primarily in twelve U.S. cities. Two scholarships are available to students placed through the program. The Academic Scholarship is a merit award of \$750 for an independent study course relevant to the student's internship. The Opportunity Scholarship is a need-based award that replaces all or part of the summer savings expectation for students on financial aid, enabling them to accept the most attractive job offer.

Through other services such as individual counseling, resume workshops, interview technique seminars, a resource library, on-campus corporate summer recruitment, weekly job bulletins, and monthly newsletters, Duke Futures Programs helps students to prepare for the transition from their academic career to their work career.

Special Summer Programs

DUKE SUMMER FESTIVAL OF CREATIVE ARTS

The Duke Summer Festival of Creative Arts is part of the summer session and an extension of the function of the Office of Cultural Affairs, coordinating the arts in the summer and providing an exciting, artistically stimulating environment for the campus and community. The Ciompi Quartet, Duke's well-known Chamber Music Ensemble, will give several performances. Other special events are planned. Distinguished artists and scholars will be involved in cocurricular sessions. Students will have the opportunity to participate in informal productions.

Summer Theater Institute. The Summer Theater Institute, for students seriously interested in theater, offers intense professional-level training in a structure that does not fit the regular school year's scheduling. Courses involve substantial contact time and carefully-prepared assignments. Open primarily to Duke students, but with the permission of the Director of Drama, students from other institutions may attend.

Primary Stages, a visiting professional theater company from New York City, will conduct developmental rehearsals of new works together with playwrights in residence. Public showings of the works as they develop are planned. Student participation will be encouraged. The company will also be involved in student workshops and public symposia on the plays under development.

Detailed information on faculty and courses may be obtained from Summer Theater Institute, 206 Bivins, Duke University, Durham NC 27708.

The American Dance Festival. The six-week program offers a wide variety of classes, performances, and workshops. For a catalog, write to the American Dance Festival, Duke University, Box 6097 College Station, Durham, North Carolina 27708.

PRECOLLEGE PROGRAM

During the summer of 1988, Duke University will offer a Term II program for academically talented rising high school seniors from across the country. The Precollege Program is designed to provide the academic challenge of college-level courses to qualified college-bound students and to help prepare them for the adjustments they will be

making when they enter college as freshmen. Students will enroll in two regular summer session classes with Duke undergraduates. Introductory level courses in the humanities, social sciences, natural sciences, and languages will be offered for college credit and there will be a wide range of campus programs and activities available as well. The students will live in supervised, air-conditioned University dormitories, eat their meals in the University dining halls, enjoy the opportunity of studying with distinguished members of the Duke faculty, and will have access to all University libraries and athletic facilities. Special programs organized by the residential staff will include sessions on such topics as research and study skills, communicative skills, health and physical fitness, selection of careers and colleges, and interpersonal relationships. For further information contact the Precollege Program, Duke University, Box 40077, Durham, North Carolina 27706-0077.

Campus Life and Activities



Student Affairs

The Division of Student Affairs strives to complement the educational mission of the University by helping to relate many of the nonacademic components of the University to the academic experiences of the students. The residence halls, the athletic fields, the Chapel, and many student organizations play an important humanistic and holistic role in the students' university experience by developing leadership qualities, skills in interpersonal relationships, and appreciation for the care of the physical self. Thus, the university experience encompasses collectively the life of the mind, body, emotions, and, indeed, the spirit.

Residential Life

Duke has a long tradition as a residential university and has sought to provide convenient housing for the majority of the undergraduate students. While the University was established to provide a formal educational opportunity for students, Duke has always taken the position that education encompasses social and personal development as well as intellectual growth. In order to facilitate such a holistic approach, Duke seeks to provide a supportive environment substantially anchored in its residential program.

Although freshmen are required to live in the University residence halls, a number of upperclassmen choose to live off campus. Students enrolled beyond their fourth year of the undergraduate program cannot be granted space in University housing. Part-time and former students who have been readmitted are not eligible for on-campus housing.

Residence Halls and Apartments. The University accommodates 91 percent of its undergraduates in sixty residence hall living groups located on East, West, and North Campuses and in apartments located on Central Campus. Within one of the residence halls, there are language corridors for students interested in speaking French, Spanish, and German.

University housing is considered to include residence hall space as well as Central Campus Apartments. Placement in any of these areas fulfills the University's obligation to house eligible students in University housing. Free on-campus bus service connecting East, West, North, and Central Campuses is provided by the University.

Freshmen reside in all-freshman houses clustered on several campuses; upperclass students reside not only in all-upperclass residence halls but also in Central Campus Apartments. Residential fraternities are housed in sections of upperclass residence halls;

by tradition, sororities are not residential. Freshman housing assignments are made by lottery to the houses in the freshman clusters while upperclass housing assignments are made by a combination of lottery and student choice. Within the residence halls, students live in single, double, or triple rooms. Living groups elect officers and organize social, intramural, and cocurricular programs, and community service projects.

All of the residence halls have resident advisers who live in the houses and are members of the staff of the Dean for Residential Life. These graduate and undergraduate students have broad responsibilities in the residential life of the University including counseling students with personal problems, advising the house governments, and serving as resource persons for students.

Residence Hall Programming. Academic, cultural, and cocurricular programming is planned and presented throughout the year in the residence halls through the cooperative work of the Office of Residential Life, Trinity College of Arts and Sciences, the School of Engineering, and resident students. There are a number of faculty members in residence in both freshman and upperclass houses. Faculty offices and seminar rooms are also located in several of the freshman houses. The goals of these various residential programs are to enhance the quality of intellectual and social life for the residents on campus, to facilitate student-faculty interaction outside of the formal classroom, and to develop a greater sense of community within the individual residence halls as well as within the greater University.

Living Off Campus. The option of living off campus is available for students after the first semester of their freshman year, and those who choose it may retain their resident status and eligibility for University housing if they follow the proper procedures as published by the Office of Residential Life.

Dining Facilities

All students living in campus residence halls are required to participate in one of five meal plan options and are able to select from a wide range of dining locations and a large variety of food offerings, all of which are available on their prepaid dining account (see "Food and Other Expenses" in the chapter "Financial Information"). In addition to two all-you-can-eat cafeterias, University Food Services provides restaurants, snack bars, delis, and a pizza take-out and delivery service. Food service operations are located on each campus.

Facilities on East Campus include the East Court Cafeteria; the Magnolia Room, a formal seated restaurant; The Dope Shop, a snack bar; and the DownUnder, an a la carte restaurant featuring sandwiches and snacks. On West Campus, students may select from the University Room, an a la carte cafeteria; the Blue and White Room cafeteria; the Oak Room, a seated dining restaurant; the Leaf 'n Ladle soup and salad bar; and the Cambridge Inn, a deli, pizza, and fast food shop. The Boyd-Pishko Cafe, Licks, and the Rathskeller, located in the Bryan University Center, also serve West Campus. The Boyd-Pishko Cafe serves breakfast items, sandwiches, and snacks. Gourmet hamburgers, deli sandwiches, and salads are featured in the Rathskeller. On North Campus, there are the Trent Drive Hall cafe and deli; and The Sprout, a soup and salad bar. The Pub, a restaurant serving specialty sandwiches, is located on Central Campus. Catering services and pizza delivery are also available.

Religious Life

Two symbols indicate how important religion has been to this University since its founding: *Eruditio et Religio*, the motto on the seal of the University, and the location of the Duke Chapel at the center of the campus. People from all segments of the University and the community gather in Duke Chapel on Sunday morning to worship in a service which offers excellent liturgy, music, and preaching. The world's outstanding Christian

preachers have preached from the Duke Chapel pulpit.

The University ministers work with the campus ministers and staff from the Roman Catholic, Jewish, and Protestant communities, and with other groups to provide a ministry which is responsive to the plurality of religious interests on the campus.

Through the religious life of the University, students are encouraged to search for meaning, to ask the ultimate questions, to worship, to meditate in the beautiful chapel, to learn from outstanding theologians from a wide array of traditions, and to work to bring about a more just and humane society.

Services Available

Student Health Service. The objective of the Student Health Service is to provide medical care and advice to students. Both the Student Health Services Clinic and the University Infirmary are available to students for that purpose. A separate mandatory fee for this service is assessed and covers most services offered within the clinic and infirmary. Counseling and Psychological Services (CAPS), which is a separate and complementary service to the Student Health Service, provides a wide range of counseling and psychiatric services which are also covered by a portion of the Student Health fee. (See next section.)

The facilities of the Student Health Clinic are open during both regular and summer sessions to all currently enrolled full-time undergraduate students, as well as to regularly enrolled students in the graduate and professional schools. For treatment of illnesses or injuries, students should first visit the Student Health Clinic. Outside regular clinic hours, students should call or visit the University Infirmary, open twenty-four hours daily during regular academic sessions. The campus bus makes regular trips to the clinic; emergency transportation to the clinic, infirmary, or Duke Medical Center emergency room can be obtained from the Duke public safety officers or from ambulance services in Durham. Resident Advisers (RAs) should be consulted, whenever possible, for assistance in obtaining emergency treatment. For a description of the specific services provided by the clinic and also by the infirmary, see the *Bulletin of Duke University: Information and Regulations*.

The health education staff, located within the student health facility at Pickens Building, is available to work with students in making informed decisions that lead to healthy lifestyles at Duke and beyond. Specific areas of concern and interest include alcohol and other drug usage, eating and nutrition, sexual activity, and stress management. Programs, meetings, and consultations are provided for both groups and individuals.

In addition to the Student Health Service, the University makes available a plan of accident and sickness insurance to cover students who are enrolled in the University. This plan is designed to complement services normally not accessible to students through the Student Health Service coverage; it covers students both on and off campus, at home, or while traveling between home and school during the interim vacation periods throughout the one-year term of the policy.

All full-time and part-time degree candidates are required to enroll in the student accident and sickness insurance policy, made available by the University, unless they show evidence that they are covered by other generally comparable insurance. This evidence of comparable coverage is given by completing the appropriate waiver statement contained in the remittance form of the University invoice. This statement requires that the name of the insurance company and the policy number be indicated as well as the signature of the student or parent. While this requirement may be waived by signing the appropriate space on the University invoice indicating a willingness to assume the medical costs of any sickness or accident, the Student Health Service strongly recommends that all students be covered by accident and sickness insurance.

Counseling and Psychological Services. Counseling and Psychological Services (CAPS) provides a comprehensive range of counseling and developmental services to

assist and promote the personal growth of Duke students. The professional staff is composed of psychologists, clinical social workers, and psychiatrists experienced in working with young adults. They provide evaluation and brief counseling/psychotherapy regarding a wide range of concerns, including such issues as self-esteem and identity, family relationships, academic performance, dating, intimacy, and sexual concerns. Also provided is career counseling, in which students may receive career testing or work with a computerized career guidance system. A career library with sources of occupational and educational information is maintained. While students' visits with counselors are usually by appointment, emergencies are handled when they arise.

Each year, CAPS offers a series of self-development seminars focusing on skills development and special interests. Topics of previous seminars have included career planning, stress management, social development, communication enhancement, and understanding eating problems.

As Duke's center for administration of national testing programs, CAPS also offers a wide variety of graduate/professional school admission tests and professional licensure and certification examinations. The staff is also available to the entire University community for consultation and educational activities in student development and mental health issues affecting not only individual students but the campus community as a whole. They work with campus personnel, including administrators, faculty, student health staff, religious life staff, resident advisers, and student groups, in meeting needs identified through such liaisons. Staff members are also available to lead workshops and discussion groups on topics of interest to students.

CAPS maintains a policy of *strict confidentiality* concerning information about each student's contact with the CAPS staff. If a student desires that information be released to anyone, written authorization must be given by the student for such release. Evaluation and brief counseling/therapy as well as career and skills development seminars are covered by the student health fee. There are no additional costs for these services.

For additional information, see the *Bulletin of Duke University: Information and Regulations*, or call (919) 684-5100.

Office of Placement Services. The Office of Placement Services is the liaison between the University community and potential employers in business, education, nonprofit organizations, and government. The purposes of the office are to give Duke students opportunities to investigate career options prior to beginning the placement process and to assist seniors in identifying employment opportunities commensurate with their qualifications, interests, and desires. An extensive file of openings for permanent employment is available, as is a library of general information about careers, employers, and graduate schools. Staff members are available to discuss career plans; permanent employment opportunities; interviewing techniques; and other related matters. Employer and graduate and professional school representatives visit Duke beginning in early October each year.

Preliminary exploration of career interests early in the student's academic career is possible through the Career Apprenticeship Program, which offers nonpaid experience in a variety of career fields. This program gives the student the opportunity to gain practical work experience and to broaden the educational experience by related field work during the undergraduate years. Students may also use the Duke Network file to identify Duke alumni, representing a variety of career fields, who have agreed to talk with undergraduates about various career paths.

Office of Minority Affairs. The Office of Minority Affairs (OMA) is an interdisciplinary/student service component of the University which assists minority students in their adjustment to student life. Although OMA primarily counsels and advises students, the office is also involved in matters relating to policy and circumstances which affect minority students. Appropriate discussions are held with faculty, staff, parents, and/or students.

The office has designed and implemented a variety of programs which are aimed at maximizing students' potential for realizing their academic goals. Three major program components are included in these efforts:

Duke PREVIEW Program (DPP). This program introduces selected precollege students to academic and student life at Duke. Courses in English, mathematics, and study skills are offered to incoming freshman students during the summer preceding matriculation. Individual, group, and peer counseling sessions in PREVIEW present students with the opportunity to exchange ideas regarding individual and group concerns.

Counseling in Academic and Social Affairs (CASA). CASA provides the ongoing leadership of a graduate counselor or undergraduate peer to each undergraduate minority student. The counselors visit with students on a regular basis, hold group discussions, and serve as sources of information and referral to all students.

Tutoring Program. This program maintains tutors in mathematics and the sciences on a regular basis for any students seeking assistance. Although many students come to the tutoring program through supportive academic personnel, most are self-referred. Tutoring is encouraged and should be arranged as soon as a need is perceived.

Offices for Program Planning

The University Union. The University Union brings together undergraduate and graduate students, faculty, administrators, employees, alumni, and others through a broad program of lectures, concerts, performing arts, exhibits, games, festivals, crafts, special events, dances, and film and video presentations and productions. It is governed by a board comprised of representatives of virtually all segments of the University community; the board also governs the operation of the Bryan University Center, where the Union is located.

The Bryan University Center is the hub of cultural, social, recreational, cocurricular, and service activities for students and other members of the campus community. In addition to the Union, the Bryan Center also houses a cafe, a snack bar, three theaters, a video auditorium, a post office, bank services, an art gallery, meeting rooms, offices for student organizations, an information center, a ballroom, a crafts center, a game room, lounges, and a mall. Also located in the Bryan Center are the University stores which provide textbooks, supplies, trade books, magazines and newspapers, health and beauty aids, gifts, and wearing apparel.

Office of Student Life. The Office of Student Life develops and coordinates the new student orientation programs for freshmen and transfer students and works closely with the Freshman Advisory Council (FAC), which is composed of upperclass men and women who are selected for qualities of responsibility and leadership. The members of the Freshman Advisory Council are each assigned a small group of freshmen. During Orientation Week, they welcome their new students and introduce them to the University; during the first semester, they continue their relationship with their freshmen, helping them make the many adjustments to university life. The office also works with entering transfer students.

Other responsibilities of this office include coordinating the application of the general rules and regulations of the University, advising the participants in the judicial process, serving as a resource center for handicapped students, advising the Interfraternity and Panhellenic Councils, and acting as a liaison with both the Student Health Service and the Department of Public Safety.

Office of Student Activities. The Office of Student Activities, located in the Bryan Center, is a resource for approximately three hundred University clubs and organizations and provides a congenial atmosphere for club work, with telephones and table space available free of charge.

The director and program associates are available for advice in planning events, for guidance in establishing new groups, and for information about activities of campus

groups. The financial manager oversees the financial affairs of student groups, Greek organizations, and residential living units. This includes processing their financial and payroll transactions; auditing their financial accounts; offering bookkeeping, budgeting, and fundraising workshops for treasurers; and providing financial advice on an ongoing basis.

The office offers a Complementary Education Program with instructional and programmatic aids to foster leadership, organizational, and financial skills among student leaders. An internship/career apprenticeship program provides students with opportunities to gain practical experience and develop job related skills in such areas as accounting, advertising, public relations, editing, administration, and data processing. Also, the office sponsors an annual Student Activities Day, coordinates Duke's participation in the Share Your Christmas Program, and participates actively in Black Student Weekend.

Office of Cultural Affairs. The Office of Cultural Affairs is responsible for the creation, coordination, and implementation of many of the cultural and popular programs which occur on campus. The office is directly responsible for the Duke Artists Series; the Chamber Arts Society Series; Quadrangle Pictures; the Summer Festival of the Arts; and the scheduling of Page Auditorium, as well as all campus activities. With the exception of athletic events, all campus entertainment programs which require tickets are handled by Page Box Office, an extension of the Office of Cultural Affairs. In addition to overseeing arts-related activities, this office assists in publishing and distributing the yearly edition of the *Duke University Calendar*.

The Mary Lou Williams Center for Black Culture. The Mary Lou Williams Center for Black Culture was dedicated in September, 1983, in memory of the "great lady of jazz" and former artist-in-residence whose name it bears. The culmination of the work and dreams of many people, the center exists to promote and preserve black expressive culture at Duke. It serves as a gathering place for black students, where they can learn more about the beauty and richness of their culture and can with pride share their heritage with other students and members of the Duke community in an atmosphere of racial harmony.

The center is composed of the Director's office, two lounge areas, a library, an art gallery, and a large meeting area. This is the site of a variety of programs planned by the Director and students, and it can also be reserved by all groups on campus.

International House. International House is the center of cocurricular programs for approximately five hundred students at Duke from sixty-seven countries, as well as for American students who are interested in other cultures, are considering study abroad (see the section on study abroad in the chapter "Special Programs"), or are planning to travel outside the United States. The International Association, sponsored by International House and composed of both American and foreign students, plans social and cultural programs which emphasize personal contact and informal exchange of ideas among students from diverse backgrounds. Included are weekly open houses with lectures, discussions, films, potluck dinners or parties; periodic trips outside of Durham; and an annual International Day on campus which draws visitors from throughout the area.

Programs of International House which assist students from abroad in participating in the life of the Duke and Durham communities include an intensive orientation program at the beginning of the academic year; the International Friend/Host Family Program, in which interested international students may become acquainted with American families or individuals; One-With-One, in which an international student is paired with an American partner for weekly meetings to work on language and life skills; Speakers' Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community; and English conversation classes which meet four hours a week on campus.

International House also has a visa specialist on the staff who works with students from abroad in fulfilling the various immigration and tax formalities involved in coming to Duke. Further information may be obtained from International House, 2022 Campus Drive, (919) 684-3585.

Student Organizations

Associated Students of Duke University. The Associated Students of Duke University (ASDU) is responsible for articulating undergraduate student thought on issues relevant to the University and for working to improve the educational process and University environment. The working philosophy of ASDU is that students have the right to participate in the University's decision-making process on matters that directly affect the student body.

The Executive Committee is responsible for the implementation of all legislative action and for the coordination of the organization. It consists of the President, four Vice-Presidents (Executive, Student Affairs, Academic Affairs, and Engineering), an Executive Secretary, an Administrative Secretary, an Attorney General, a Press Secretary, and a Director of Student Services.

The ASDU legislature is composed of representatives from each undergraduate living group on campus, representatives of students living off campus and on Central Campus, and representatives selected from the entire student body. Within the legislative branch, there are four committees (Academic Affairs, Student Affairs, External Affairs, and Buildings and Grounds) which initiate legislation and projects to benefit the student body. Another legislative committee, the Student Organizations Committee, is responsible for allocating the student activities fee paid by each undergraduate to various chartered clubs and organizations.

ASDU's services seek to aid every undergraduate during his/her Duke career. These services include a student legal assistance program, a check cashing service, a maternity/abortion loan fund, a bail loan fund, a ride-rider board, babysitting and typing files, the Safe Rides Program, and a student travel service.

Cultural and Social Organizations. The scope of the more than three hundred student organizations is suggested by a partial listing of their names: Alpha Phi Omega service fraternity, Black Student Alliance, Baptist Student Union, Cheerleaders, International Association, Duke Ice Hockey, Outing Club, Sailing Club, Model United Nations Club, Photography Group, and the N.C. Public Interest Research Group. Twenty-one national social fraternities and thirteen national sororities are represented on campus. They are governed by the Interfraternity and Panhellenic Councils, respectively.

Many opportunities are provided on campus in the areas of music and drama. The Chorale, Modern Black Mass Choir, Chapel Choir, Wind Symphony, Marching Band, Symphony Orchestra, and Collegium Musicum are examples of musical organizations. Duke Players perform established and experimental drama; Hoof 'n' Horn presents musical comedy; Karamu performs drama related to the black experience.

Several academic departments sponsor organizations and programs for students with special academic or professional interests. There are over twenty academic department majors unions on campus. There are also academic and leadership honorary societies.

Media. The *Duke Chronicle*, the campus newspaper, publishes five issues weekly and is governed by the Chronicle Board. A humor magazine (*Jabberwocky*), a literary magazine (the *Archive*), a special topics newspaper (*The Missing Link*), a feature magazine (*Tobacco Road*), a humanities review (*Eruditio*), a science magazine (*Vertices*), and the *Duke Journal of Politics* are published on a regular basis by students. In addition, a *Teacher-Course Evaluation Book* and a comprehensive yearbook, the *Chanticleer*, are produced each year. The *DukEngineer*, the official student magazine of the School of Engineering, appears twice each year and contains articles on technical and semitechnical topics as well as other matters of interest to the school. These publications are under the direction of the Un-



dergraduate Publications Board, which chooses the editors and business managers, and reviews the financial budgets of all such franchised publications. WXDU 88.7 FM is the student-managed and programmed radio station, broadcasting to the Duke and Durham communities. Duke Union Community Television (Cable 13) is operated by students and produces color television programs that are broadcast throughout the campus on the University cable system.

Project WILD. Project WILD (Wilderness Initiatives for Learning at Duke) is a unique student organization which, through the ideal of experiential education (learning through doing), tries to ease the transition period into college for Duke students. Run totally by students, the program strives to teach self-worth, group awareness, and an appreciation of nature. WILD, a ten-day course held prior to Orientation Week, runs backpacking crews through the North Carolina mountains. In addition to this August course, WILD also sponsors activities including weekend trips, house courses, March and May wilderness courses, and a year-round ropes course available to the entire University.

Health, Physical Education, and Recreation

Besides offering a variety of classes (see the chapter "Courses of Instruction"), the Department of Health, Physical Education, and Recreation also sponsors numerous programs for all students in intramurals, sports clubs, and recreation.

The Intramural Sports Program provides an opportunity for every student to participate in organized recreation competition in forty-three activities. The program is comprised of three major areas: men's intramurals, women's intramurals, and co-rec intramurals. It is open to all graduate and undergraduate students as well as to faculty and staff of Duke University. Participation, not skill, is a major factor that is emphasized in the program.

More than thirty sports clubs have been chartered by Duke students for those with similar interests to participate in competition and recreational activities. Clubs vary from those which compete with clubs of other universities, such as soccer, rugby, and ice hockey, to those of a more recreational nature such as cycling, scuba diving, and sailing, and one which yearly presents several performances, the water ballet club.

The University's many recreational facilities, available to all students, include the championship Robert Trent Jones Golf Course, tennis courts (some lighted) on both campuses, swimming pools on both campuses, three gymnasiums, a weight training room, squash and racquetball courts, outdoor handball and basketball courts, an archery range, horseshoe courts, an all-weather track, numerous playing fields, jogging trails, and informal recreational areas. Tournaments in recreational sports are often organized and conducted by students. Students may reserve facilities and equipment at designated times.

Intercollegiate Athletics

The Athletic Department fosters intercollegiate athletics by striving for excellence and by providing the best possible framework within which highly accomplished student athletes can compete. The department has a dual responsibility to provide a high-quality athletic program and environment so that all students have the opportunity to compete to the fullest extent of their abilities. Duke is a member of the National Collegiate Athletic Association and the Atlantic Coast Conference (ACC). The ACC consists of Clemson, Duke, Georgia Tech, Maryland, North Carolina at Chapel Hill, North Carolina State, Virginia, and Wake Forest.

The intercollegiate program for men includes football, cross-country, soccer, basketball, swimming, fencing, wrestling, indoor and outdoor track, baseball, golf, soccer, tennis, and lacrosse. The women's athletic program provides intercollegiate competition in basketball, fencing, field hockey, golf, swimming, tennis, volleyball, indoor and outdoor track, and cross country. Freshmen may participate on all varsity teams.

The Director of Athletics and Assistant Directors of Athletics provide departmental leadership and coordinate all athletic policies with the University Athletic Council. The council consists of representatives from the undergraduate student body, the faculty, the administrative staff, the trustees, and the alumni. The council meets with the Director of Athletics periodically during the school year. The chairman of the council is the official University representative at national and conference athletic meetings.

The Duke Student Honor Commitment

"The Duke Student Honor Commitment" was proposed by the members of the class of 1982. Different from and in addition to the Judicial Code, the Honor Commitment is a personal commitment of honor and integrity which is self imposed and not enforced by an outside authority.

Following is a copy of this commitment:

A unique aspect of a liberal education is its attempt to instill in the student a sense of honor and high principles that extends beyond academics. An essential feature of Duke University is its commitment to an atmosphere of integrity and ethical conduct. As a student of Duke University I accept as my personal responsibility the vigorous maintenance of high standards of honesty, truth, fairness, civility, and concern for others.

My devotion to integrity establishes that I will not cheat in academic work, and that I will adhere to the established and required community code of conduct. According to the dictates of my own conscience, I will report behavior in violation of such established standards. In addition and beyond the requirements of any code

or law, I confirm my own commitment to personal honor and integrity in all matters large and small. Even though the ideal of honor is an abstract one, by implementing this ideal, I join the men and women of Duke University in making the concept of honor a reality.

Judicial System and Regulations

Duke University expects and requires of all its students full cooperation in developing and maintaining high standards of scholarship and conduct. Each student is subject to the rules and regulations of the University currently in effect, or which are put into effect from time to time by the appropriate authorities of the University. At the same time, the individual is responsible for decisions and choices within the framework of the regulations of the community, as Duke does not assume *in loco parentis* relationships.

Students, in accepting admission, indicate their willingness to subscribe to and be governed by these rules and regulations. They acknowledge the right of the University to take disciplinary action, including suspension or expulsion, for failure to abide by the regulations or for other conduct adjudged unsatisfactory or detrimental to the University.

Responsibility for prescribing and enforcing rules and regulations governing student conduct rests ultimately with the Board of Trustees of Duke University and, by delegation, with administrative officers of the University. In the undergraduate schools, and in the University as a whole, many of these rules have been established over the years by cooperative action between students, faculty, and administrative officers. Representative student organizations, such as student governments and judicial boards, and more recently, community-wide bodies of students, faculty, and administrators, have initiated proposals for policies and rules necessary to assure satisfactory standards in academic and nonacademic conduct. These proposals have been accepted by University officers and have become a substantial, if not all-inclusive, body of rules governing student life at Duke. For current regulations, refer to the *Bulletin of Duke University: Information and Regulations*.

Students in Trinity College of Arts and Sciences and in the School of Engineering constitute an undergraduate community whose members are subject to the Undergraduate Community Code. Violations of the code and of certain University regulations by individuals are adjudicated before the Undergraduate Judicial Board, composed of representatives of the student body, the faculty, and the administration. The constitution of the board, the Judicial Code of the Undergraduate Community, the procedural safeguards, and rights of appeal guaranteed to students are published in the *Bulletin of Duke University: Information and Regulations* for the undergraduate community. As provided in the judicial structure of the University, each residential unit may have a judicial board which has jurisdiction over all offenses involving violations of regulations relating to dormitory procedures and social regulations not covered by the undergraduate community code or University policies and regulations. The Residential Judicial Board may function as an appellate body in cases involving appeals from the individual house judicial boards and has original jurisdiction over group violations of the code as well as in disputes involving two or more living groups. For further information, refer to the *Bulletin of Duke University: Information and Regulations*.

Student Discrimination Grievance Procedures

The Duke University policy on nondiscrimination is set forth on the credits page of this bulletin. Procedures for investigation and remedy of any complaint and for appeal of any decision are detailed in the *Bulletin of Duke University: Information and Regulations*.

Student Obligations and Requirements

Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the University.



Admission



Principles of Selection

James B. Duke, in his Indenture of Trust, requested that “great care and discrimination be exercised in admitting as students only those whose previous record shows a character, determination, and application evincing a wholesome and real ambition for life.” In this light, and in view of the institution’s limited enrollment, Duke University looks beyond the basic characteristics of academic competence possessed by the majority of applicants. It seeks, in each prospective student, regardless of race, sex, color, religion, handicap, or national origin, not only evidence of intellectual promise and maturity of judgment, but also a degree of positive energy. Often, this energy is expressed in the form of special talents and accomplishments; it is seen consistently in a student’s determination to make creative use of the opportunities and challenges posed by Duke University.

Requirements for Application

As there are occasionally changes in admission policies or procedures after the printing deadline for the *Bulletin of Duke University: Undergraduate Instruction*, candidates are urged to consult the *Bulletin of Duke University: Information for Prospective Students* for specific admissions information, dates, and policies.

DEGREE STATUS

Although there are no inflexible requirements as to subject matter, students are urged to choose a broad and challenging high school program. At least twelve units of acceptable college preparatory work must be presented for review. Applicants to the School of Engineering are advised to take four units of mathematics and at least one unit of physics or chemistry.

The Scholastic Aptitude Test (SAT), given by the College Board, and three achievement tests (one of which must be English Composition, with or without essay) are required of all candidates for freshman admission and must be taken by the spring of the junior year for Early Decision and by January of the senior year for April Notification. Since placement in foreign language study and fulfillment of the foreign language requirement can be determined by an Achievement Test score, candidates who have studied a foreign language should take the Achievement Test in that language by June of the senior year in secondary school. Candidates may submit results of the American College Testing Program (ACT) in lieu of SAT and Achievement Test scores, provided the test is taken by December of the senior year for April Notification applicants and by June of the junior year for Early Decision applicants; the scores must be made available to the

Admissions Committee thirty days before the decision date. Candidates for the School of Engineering who elect to take the College Board test battery are required to take an Achievement Test in mathematics, either level 1 or level 2.

NONDEGREE STATUS

Summer Session. Persons who are or were at the time of leaving their home institutions in good standing in accredited colleges or universities may be admitted for summer study only by the Director of the Summer Session.

Continuing Education. Admission as a nondegree student at Duke is limited to: people residing in the area who, because of family and work responsibilities, have no other access to education; Duke graduates of the preceding year; people who will be moving to the area and who will reside here for a substantial period of time; local high school students; and Duke University employees. These students are given academic and career counseling by the Office of Continuing Education; they are subject to most of the regulations set forth for degree candidates.

Application Procedures

DEGREE STATUS

A Bulletin of Duke University: Information for Prospective Students, which contains the first part of the application, may be obtained from the Office of Undergraduate Admissions, Duke University, Durham, North Carolina 27706. A nonrefundable processing fee of \$50 must accompany the first part of the application.

A personal interview at Duke is not required for admission; students who find it possible to visit the campus, however, may call or write for an interview. Area alumni interviews are also available for most applicants after Part I of the application has been filed. Interviews cannot be granted from January through April, when applications are under review.

April Notification. Candidates for admission to the freshman class must submit the first part of the application by December 15 and final applications no later than January 15 of their senior year in secondary school. Decisions are mailed from the University by April 15, and accepted candidates are expected to reserve a place in the class by May 1 with a nonrefundable deposit of \$500.

Early Decision. Students with superior credentials for whom Duke is a clear first choice may apply for early decision. Candidates who apply for early decision are required to sign a statement confirming their commitment to enroll at Duke if they are admitted in the early decision process and to withdraw applications from other colleges and universities as soon as they learn of their admission to Duke. Secondary school counselors and parents are also asked to sign the early decision agreement.

Students applying for early decision should submit the first part of the application by October 8. Deadline for final applications is November 8. The SAT or the ACT must be taken in the spring of the junior year. Achievement Tests should also be taken in the spring since early decision applicants who have not completed their Achievement Tests will be deferred to April notification. Applicants are notified of their status—admit, defer, or reject—by December 15. Admitted students pay a nonrefundable deposit of \$500 by January 5. The credentials of candidates who are deferred are considered along with those of students who request an April 15 decision. Deferred students are no longer bound by the early decision agreement and are free to accept offers of admission from other colleges and universities.

This plan is designed to give exceptional students who know Duke is their first choice a means of indicating that commitment to the University and of receiving a decision early enough to eliminate the necessity of applying to several colleges.

Midyear Admission. Midyear admission allows a limited number of freshmen to begin their college work a semester early or to postpone matriculation for a semester. Midyear applicants are expected to complete all the requirements for fall admission. The application deadline for new candidates is September 15 for the first part of the application and October 15 for the final application; students will be notified of the decision on their applications by November 15, with the expectation that those who are accepted will reply by December 1 with a nonrefundable deposit of \$500.

Transfer Admission. Transfer admission from other accredited institutions may be arranged for a limited number of students each semester. Because the transcript of at least a full year of academic work is preferred by the Admissions Committee, and because transfer students are required to spend their last two years at Duke, most candidates apply to Duke during their third or fourth semester in college. Candidates submit official transcripts of all work completed at other accredited colleges, high school records, scores on the Scholastic Aptitude Test, and employment records if there has been an extended period of employment since graduation from secondary school, along with completed application forms. See the section on transfer credit in the chapter "Academic Procedures and Information." Transfer students are eligible for university housing.

June (Term II, summer session) and September (fall semester) transfer students meet a March 1 deadline for the first part of the application and an April 1 final application deadline, learn of their decisions by May 15, and respond to the University by June 1 with a nonrefundable deposit of \$400 or \$500, if housing is requested. January transfer students submit the first part of the application by September 15 and final applications by October 15, learn of their decisions by November 15, and reply to the University by December 1.

NONDEGREE STATUS

Summer Session. Application forms and schedules of courses may be obtained by writing or calling the Office of the Summer Session, 121 Allen Building, Duke University, Durham, North Carolina 27706; (919) 684-2621. No application fee is required.

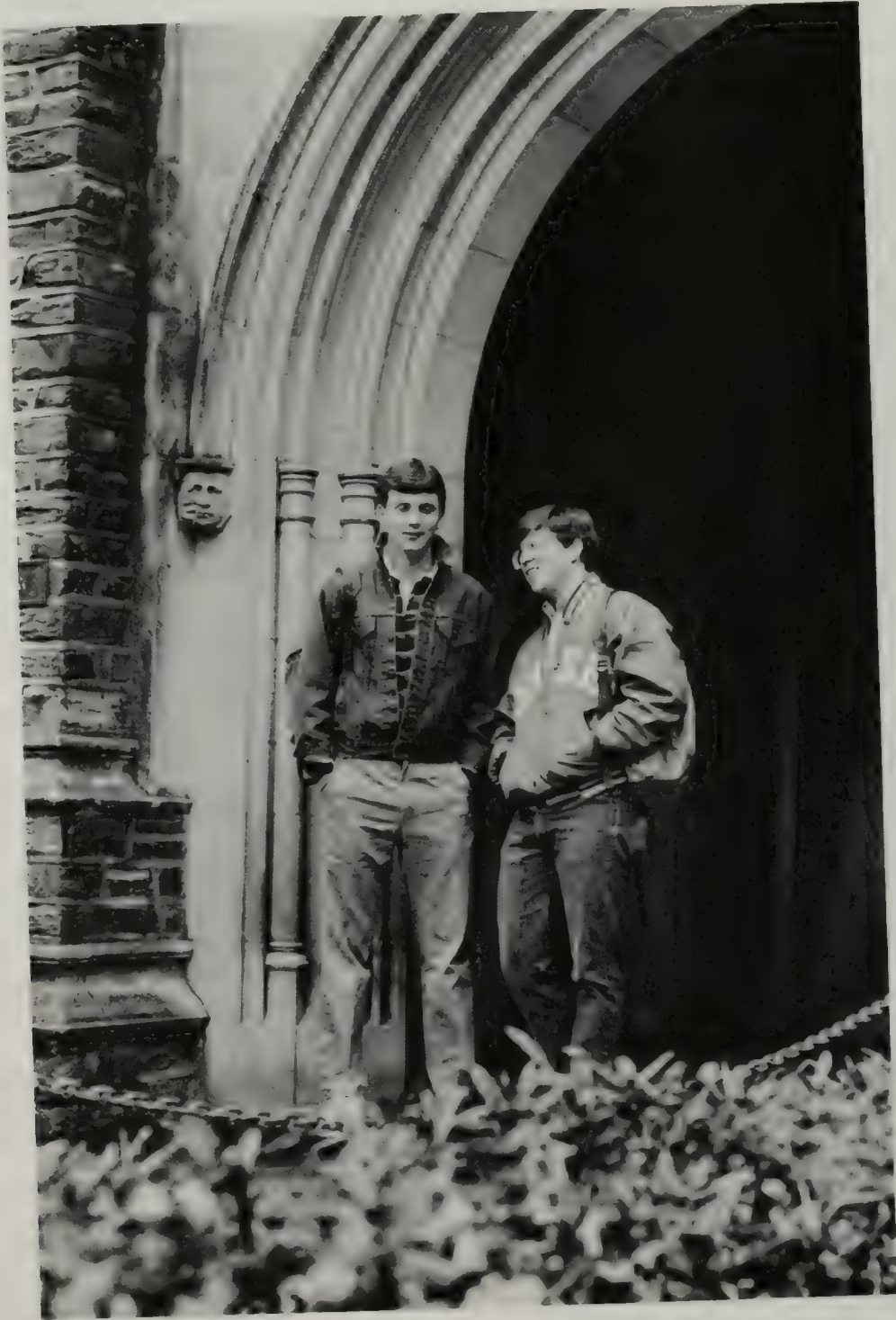
Continuing Education. Applications may be obtained from the Office of Undergraduate Admissions and must be returned to that office, accompanied by a \$35 application fee, by August 1 for the fall semester and by December 1 for the spring semester.

At least four courses must be completed successfully before a nondegree candidate may apply for degree candidacy. Students who plan to complete the four courses should not expect automatic admission to the University. More detailed information is available from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708.

READMISSION OF FORMER STUDENTS

A student who desires to return, following withdrawal from college, should apply to the appropriate college or school. (See the section on readmission procedures in the chapter "Academic Procedures and Information.") Students who have been withdrawn from the University for five or more years must submit a new application to the Office of Undergraduate Admissions.

Financial Information



Tuition and Fees

No college or university can honestly state that an education at the college level is inexpensive. Fees paid by students cover less than half the cost of their instruction and the operation of the University. Income from endowment and contributions from alumni and other concerned individuals meet the balance and assure each student the opportunity to pursue an education of unusually high quality.

Students are urged to give their attention first to the selection of institutions which meet their intellectual and personal needs, and then to the devising of a sound plan for meeting the cost of their education. This process will require an in-depth knowledge of both the University's financial aid program and the resources of the student's family. A brochure describing in detail the various forms of financial aid may be obtained from the Office of Undergraduate Financial Aid, Duke University, Durham, North Carolina 27706.

Estimated Expenses.* Certain basic expenditures, such as tuition, room, and board, are considered in preparing a student's budget. These necessary expenditures, with a reasonable amount allotted for miscellaneous items, are shown below:

	<i>Academic Year, 1988-89 (two semesters)</i>	<i>Two Summer Terms, 1988 (one semester equivalent)</i>
Tuition		
Returning Students	\$10,600+	\$3,480-\$4,060
Entering Students	\$11,950+	\$3,480-\$4,060
Residential Fee		
Single Room	\$2,136-\$2,803	\$1,348
Double Room	\$1,606-\$2,113	\$674
Food		
100% board plan	\$2,332	\$980
75% board plan	\$1,952	\$735
Books and Supplies	\$470	\$230
Student Health Fee	\$238	\$74

†For the School of Engineering, the tuition for returning students is \$11,485; for entering students, \$12,570.

It should be realized that additional expenses will be incurred which will depend to a large extent upon the tastes and habits of the individual. The average Duke student, however, can plan on a budget of approximately \$17,750 for entering students and \$16,400 for returning students for the academic year.* The budget estimate for the summer (two terms, one semester equivalent) is \$5,945.* These budgets are all-inclusive except for travel costs and major clothing purchases.

*The figures in this section are projections and are subject to change.

Registration Fees and Deposits for Fall and Spring. On notification of acceptance, students are required to pay a nonrefundable first registration fee of \$40 and to make a deposit of \$460. The deposit will not be refunded to accepted applicants who fail to matriculate. For those who do matriculate, \$100 of the deposit serves as a continuing residential deposit for successive semesters, and the remaining \$360 serves as a continuing registration deposit.

Late Registration. Continuing students who fail to register during the registration period must pay a fee of \$50 to the Bursar.

ROTC Deposit. An Air Force ROTC deposit of \$10 is required of students enrolling in air science to cover possible loss of military equipment issued to them. This deposit is refunded to the student upon return of issued equipment.

Part-Time Students. In the regular academic year students who register for not more than two courses in a semester are classified as part-time students. Part-time students will be charged at the following rates: one course, returning students \$1,325, entering students \$1,494 (for engineering courses, \$1,436 and \$1,572); half course, returning students \$662.50, entering students \$747 (for engineering courses, \$718 and \$786); quarter course, returning students \$373.50, entering students \$359 (for engineering courses, \$359 and \$393). Registration for more than two courses requires payment of full tuition. Graduate students registered for undergraduate courses will be assessed three units for non-laboratory courses and four units for laboratory courses. Men and women in nondegree programs who are being considered for admission to degree programs, as designated by the Office of Continuing Education, pay fees by the course at the returning student rate whether the course load is one, two, or three courses.

Auditors. Auditing one or more courses without charge is allowed for students paying full fees, provided that the consent of the instructor is obtained. Students who are enrolled for one or two courses may audit other courses by payment of \$135 for returning students, \$150 for entering students (\$143 and \$157 for engineering) for each course audited. With the consent of the appropriate instructor and the Director of Continuing Education, graduates of Duke may audit undergraduate courses for the above payment per course at the returning student rate.

Payment of Accounts for Fall and Spring. The Office of the Bursar will issue invoices to registered students for tuition, fees, and other charges approximately four to six weeks prior to the beginning of classes each semester. The *total amount due* on the invoice is payable by the invoice late payment date which is normally one week prior to the beginning of classes. As part of the admission agreement to Duke University, a student is required to pay all invoices as presented. If full payment is not received, a late payment charge as described below will be assessed on the next invoice and certain restrictions as stated below will be applied. Failure to receive an invoice does not warrant exemption from the payment of tuition and fees nor from the penalties and restrictions. Nonregistered students will be required to make payment for tuition, fees, required deposits, and any past due balance at the time of registration.

Multiple Payment Plan. The Multiple Payment Plan allows students and their parents to pay part or all of the annual financial obligations for tuition, room, and board in nine equal installments. An annual nonrefundable participation fee is charged, but no interest is charged. The initial payment is made by check and subsequent payments are made by bank drafts. Questions regarding this plan should be directed to the Office of the Bursar, 101 Allen Building, (919) 684-3531.

Guaranteed Tuition Plan. The Guaranteed Tuition Plan offers undergraduate freshmen who are not recipients of University supported financial aid and their parents the opportunity of paying four years of tuition in forty-four installments. The tuition is guaranteed at the freshmen fall semester rate and financed at a set rate of interest. The initial payment is made by check and subsequent payments are made by bank drafts. Questions regarding this plan should be directed to the Office of the Bursar, 101 Allen Building, (919) 684-3531.

Late Payment Charge. If the total amount due on an invoice is not received by the invoice late payment date, the next invoice will reflect a penalty charge of 1-1/4 percent per month assessed on the past due balance regardless of the number of days past due. The past due balance is defined as the previous balance less any payments and credits received on or before the late payment date and also any student loan or scholarship memo credits related to the previous balance which appear on the invoice.

Restrictions. An individual will be in default of this agreement if the *total amount due* on the student invoice is not paid in full by the invoice late payment date. An individual who is in default will not be allowed to register for classes, receive a copy of the academic transcript, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, an individual in default may be subject to withdrawal from school.

Tuition and Fees for Summer Session. Tuition for undergraduates is \$870 for each nonlaboratory or 3 semester hour (s.h.) course, \$1,160 for each laboratory or 4 s.h. course, \$580 for each half course (2 s.h.), and \$1,740 for each one and one-half course program (6 s.h.) offered at the Marine Laboratory.

Tuition for graduate students taking an undergraduate course is as indicated above.

Health Fee. All Duke students and all full-time non-Duke students are required to pay \$37 per term. All students at the Marine Laboratory are required to pay \$31 per five-week registration period.

Scuba Diving Fee. A fee of \$100 will be charged for each scuba diving class.

Studio Fee. A fee of \$40 will be charged for each studio art class.

Music Fee. A fee of \$100 will be charged for Music 081 and 085. A fee of \$200 will be charged for Music 091 and 095 .

Auditing Fees. With permission of the instructor and the Director of the Summer Session, students registered for a full course program (two courses) may audit nonlaboratory courses except physical education and dance activity courses, studio art courses, applied music courses and foreign programs. No extra charge is made.

Students carrying less than a full course program may be granted permission by the instructor and the Director of the Summer Session to audit a course (the above exceptions apply) but must pay half the University fee for the course.

Payment of Tuition and Fees. The University does not mail statements for summer session tuition and fees. All summer tuition and fees and any past due balance should be paid in the Office of the Bursar (101 Allen Building) at least five full working days prior to the first day of class (see Summer Session calendar). Students registering by mail may forward payment to the Office of the Bursar, 101 Allen Building, Duke University, Durham, North Carolina 27706. Students who fail to pay tuition and fees and/or otherwise fail to clear with the Bursar by the end of the drop/add period will be withdrawn from their courses. These withdrawn students will be billed the health fee and an administrative withdrawal fee of \$150 per course (\$75 per half-course) and receive a "W" for each course for which they were registered. (See the section on Refunds and Administrative Withdrawal Charges concerning penalties in this chapter). Students who, subsequent to withdrawal, clear with the Bursar may, with written permission of their academic dean, be reinstated in their classes as originally registered and receive regular grades instead of "Ws." The administrative withdrawal fee will stand and the student will be liable for full tuition and fees. Students who are unable to meet these deadlines should consult with the Bursar and their academic dean prior to the deadline.

Late Fee. Students who fail to register and pay all tuition and fees before five full working days prior to the first scheduled class day of a given course will pay an extra charge of \$25.



Transcripts. Requests for transcripts of academic records should be directed to the Associate Registrar. Ten days should be allowed for processing. A fee of \$2, payable in advance, is charged for each copy.

Duke Employees. Employees may request through the Office of Continuing Education permission to take for credit or audit up to two courses during any one semester or one during a summer term. Permission may be granted based on the individual merits and circumstances of each application. A formal application for credit course work must be submitted by December 1 for the spring semester, or August 1 for the fall semester. Half-time employees with one or more years of service who receive permission to take such courses will be charged one-half the tuition rate shown above for part-time students during the fall and spring and one-half of the summer tuition rate. This benefit applies only to nondegree work. Full-time (thirty or more hours a week) employees with two or more years of service who receive permission to take such courses will be charged one-tenth the tuition rate for credit course work and will be permitted to audit at no charge. This benefit continues after degree candidacy has been attained. Eligible employees should consult the Benefits Office, 705 Broad Street, (919) 684-6723, at least one week in advance of payment date to obtain the appropriate tuition voucher.

Living Expenses*

Housing for Fall and Spring. In dormitories for undergraduate students the housing fee for a single room ranges from \$2,136 to \$2,803 for the academic year; for a double room, the fee ranges from \$1,606 to \$2,113 per occupant.

To reserve University housing for the fall semester, returning students who are eligible for and wish to occupy such housing must make a \$50 prepayment of the housing fee at a designated time during the spring semester.

Detailed information concerning the student's obligations under the housing contract and the consequences of failure to comply are published in the *Bulletin of Duke University: Information and Regulations*.

Housing for Summer. For detailed information on types and costs of accommodations available at Duke University for the summer session write: Department of Housing Management, 016 West Union Building, Duke University, Durham, North Carolina 27706.

Food and Other Expenses. University Food Services and Duke University Store operations are located on campus to serve the needs of the Duke community. The University identification card, known as THE DUKE CARD, can be used to gain access to prepaid accounts and make purchases in many Duke University facilities.

There are two accounts: the dining account, used to purchase food items in University Food Services (UFS) and Duke Stores operations; and the flexible spending account, used to purchase any goods or services of UFS, Duke Stores, and other operations.

All students living in campus residence halls are required to participate in the dining plan account and may choose one of five plans ranging in cost from \$610 to \$1,166 per semester. The flexible spending account is optional and may be set for \$50 or more.

Information regarding these accounts is sent to matriculating students. For more information about campus retail and food facilities, see the chapter "Campus Life" in this bulletin.

*The figures contained in this section are projections and are subject to change prior to the beginning of the fall 1988 semester.

Fall and Spring Refunds

In the case of withdrawal from the University, students or their parents may elect to have tuition refunded or carried forward as a credit for later study according to the following schedule:

<i>Withdrawal</i>	<i>Refund</i>
Before classes begin	Full amount
During first or second week	80 percent
During third, fourth, or fifth week	60 percent
During sixth week	20 percent
After sixth week	None

Tuition charges paid from grants or loans will be restored to those funds on the same pro rata basis and will not be refunded or carried forward. In the event of death, a full tuition, fees, and residence hall refund will be granted. Also, the outstanding balance of the food service board plan will be refunded.

In the case of dropping special fee courses (e.g. music, art, golf), or of part-time students dropping audit courses, a full refund will be granted students during the drop-add period. Students changing status to part-time are required to request permission at the time of preregistration; therefore, no refunds are granted during the drop/add period or subsequently for changes which involve carrying less than a full-time load.

The registration deposit will be refunded to students whom the University does not permit to return, who graduate, or who request the refund prior to registration, thereby indicating their intention not to return for the following semester. The registration deposit will not be refunded to students who register for the following semester but fail to enter. Arrangements for refund of the \$100 residential deposit are described in the housing contract.

Summer Administrative Withdrawal Charges and Refunds*

Drop or Administrative Withdrawal Charges. Students who will not be attending a summer term or course for which they have registered (i.e., have submitted a course card) must officially drop the course(s) prior to the beginning of the term whether or not they have paid tuition and fees. (See the section on course changes for the summer term in the chapter "Academic Procedures and Information.") Students who fail to drop the course(s) prior to the beginning of the term will be charged \$150 per course (\$75 per half-course) plus the health fee.

Refunds (Except Foreign Programs). Students who will not be attending a summer term or course for which tuition and fees have been paid are eligible for refunds following these policies:

1. There is no refund of tuition and fees if the student drops a course(s) or withdraws from the term after the third day.
2. Full tuition less \$150 per course (\$75 per half-course) is refunded if the student officially drops a course(s) or withdraws from the term during the first three days. The health fee is not refunded. (There is no charge for drop/adds that result in no change in course load in the same term.)
3. Full tuition and fees are refunded if the student officially drops a course(s) or withdraws from the term before the first day.

Student Aid

Duke University is strongly committed to its financial aid program and for the four years of undergraduate enrollment will meet 100 percent of the demonstrated need of

*This policy does not apply to foreign program students.

each admitted student. The University's aid program includes both merit and need-based scholarships, work-study, the Perkins Loan (formerly National Direct Student Loan Program), and the Guaranteed Student Loan Program (GSL). Students needing assistance are strongly encouraged to apply for financial aid. Students receiving financial aid will be notified at the same time that they are offered admission.

For the student with demonstrated need, the net cost of an education at Duke University will generally be no greater than that for attendance at any college or university. It is the intention of the Office of Undergraduate Financial Aid to set each award at a level consistent with a student's ability to meet the costs of attending Duke University. This will be done by taking into consideration the contribution that can reasonably be expected from the student, the family, and any available outside sources. During the current academic year, over forty percent of the student body receives more than sixteen million dollars in aid of various types.

Financial Aid for Entering Freshmen. Candidates should initiate their application for financial aid concurrently with their application for admission during the fall semester of their senior year in secondary school. Instructions concerning the specific requirements and deadline dates will accompany application materials. The Financial Aid Form (FAF) must be submitted to the College Scholarship Service. In divorce cases, the University requires both parents to complete and submit a FAF which may be obtained either from a high school guidance counselor or from the Financial Aid Office. A notarized copy of all pages, including schedules and attachments, of the parents' and student's current Federal Income Tax Form must be submitted to the Financial Aid Office on or before May 1. Information provided on the FAF will be validated through the use of the tax return.

Financial aid recipients wishing to operate a motor vehicle on campus must first register it with the Financial Aid Office. As an automobile represents an asset, the value of a financial aid recipient's car will be considered in the estimation of a student's need. As a general rule, a student's annual contribution will be increased by 35 percent of the value of the car.

Renewal of Financial Aid after the Freshman Year. Each year students must file an application for renewal of financial aid. This application must include a new Financial Aid Form and a notarized copy of all pages, including schedules and attachments, of the parents' and students current federal income tax return. Application packets may be picked up in the Financial Aid Office in late December.

To have financial aid renewed, a student must meet the continuation requirements outlined on pages 23, 24, and 41, 42, as appropriate. Students not qualifying for financial aid due to their inability to meet these requirements may appeal directly to the Financial Aid Office. Students holding merit scholarships are required to maintain an average considerably higher than the minimum required for need-based financial aid recipients. Specific details regarding retention standards will be provided to scholarship winners.

Summer School Financial Aid. Financial aid is available for each summer session. Interested students can obtain specific details and an application through the Financial Aid Office in March of each year.

Types of Financial Aid. Gift scholarships or grants, long-term loans, and employment are integral parts of the financial aid program, and some portion of the aid offered an undergraduate is normally in each of these forms.

The work-study opportunity and loan(s) offered as financial aid are considered to be the self-help portion of the award. The standard aid package at Duke provides that the first \$2,400 to \$3,600 of each student's need be awarded in the form of self-help funds. Funds awarded in excess of this amount will generally be grant funds. This combination of University grant funds and opportunities for self-help enables Duke to extend its resources to a larger number of deserving students. A student may choose not to ac-

cept any portion of an aid award with the understanding that the responsibility for providing the dollar equivalent is accepted by the individual.

Duke has several scholarships based on need which are available from personal endowments and corporations. Some are intended for entering freshmen, whereas others are awarded to upperclass students. These scholarships may be based on achievement in a particular field or on an outstanding overall record.

Gift Scholarships. The following are among the named gift scholarships offered through Duke University. Where specified, these scholarships are renewable for four (4) years for those students meeting the following academic standards:

Renewable merit scholarships will be continued for freshmen who complete the first year of studies with a 2.8 average or higher. Upperclass students must complete each academic year with a 3.0 average or higher. Students failing to meet these standards will be placed on probation for one semester during which they must maintain a 3.0 average or higher. Failure to maintain a 3.0 average or higher in subsequent semesters will lead to cancellation of the scholarship.

Angier B. Duke Memorial Scholarships. The Angier B. Duke Memorial Scholarships, competitively awarded on the basis of academic merit, have been established to encourage the intellectual achievement of men and women by recognizing those who possess outstanding academic and leadership abilities. Candidates are selected on the basis of intellectual performance, creative talent, and promise of being eventual leaders in whatever field of endeavor they choose. The scholarship is a four-year program (eight semesters), and a student's continuation in the program is contingent upon good academic performance. All 1987-88 scholarship holders received \$10,000 if enrolled in Trinity College of Arts and Sciences, and \$10,835 if enrolled in the School of Engineering. Approximately twenty-five scholarships are awarded each year. Students demonstrating additional need will receive a grant from Duke University funds up to the amount needed. All Angier B. Duke Scholars participate in a six-week summer study program at Oxford University in England after the junior year. Under the program the scholarship pays tuition, single room accommodation, full board, designated excursions for all scholars, and an allowance for transatlantic air fare between New York and London. Those choosing not to participate in the Oxford program are eligible for a \$2,000 grant for an approved independent project. At least one of the four years of the scholarship could be used abroad on an approved program.

W. N. Reynolds Memorial Scholarships. Recipients of these awards are students with outstanding ability and/or need who show promise of constructive leadership. In considering candidates for the awards, consideration will be given in the following order: (1) children of employees of R. J. Reynolds Tobacco Company or any of its affiliates or subsidiaries; (2) children of families residing in Forsyth County, North Carolina; and (3) other candidates who are residents or natives of North Carolina. There are a number of awards available for each freshman class with a value of \$500 to \$3,600 annually.

A. J. Fletcher Scholarships. These music department scholarships are given to students who can demonstrate, by tape or audition, talent and achievement in instrumental or vocal performance. These awards are at least \$500 per year and are renewable annually for up to four years. Although recipients are not required to major in music, they are required to study privately and to participate in departmental performing groups.

Lionel Hampton Scholarship. This award of \$500 (not renewable) is given to an incoming freshman who demonstrates high proficiency in an instrument and strong potential in jazz performance.

United Methodist Scholarships. A number of United Methodist Scholarships are available on a basis of demonstrated need to Methodist students who have given evidence of leadership in their local Methodist Youth Fellowship groups.

Alice M. Baldwin Scholarships. One or more of these scholarships, varying in amount from \$500 to \$2,500, are awarded to women who are rising seniors in Trinity College of Arts and Sciences on the basis of scholarship, character, and leadership.

Evelyn Barnes Memorial Scholarship. One \$400 or two \$200 grants are awarded to undergraduate women who are contributing to the musical life of the University. Scholarship, character, and leadership are considered. Recommendation by a member of the music faculty is required.

Panhellenic Scholarship. A scholarship of approximately \$1,000 is awarded to an upperclass woman in Trinity College of Arts and Sciences on the basis of scholarship, character, leadership, and service.

J. A. Jones Memorial Scholarships. The scholarships, sponsored through the Jones Fund for Engineering, are awarded to engineering students whose outstanding academic and personal qualifications suggest that they will become leaders in a technological society. The awards range from a yearly sum of \$1,000 to \$3,000, depending on the degree of need.

Robert H. Pinnix Scholarships. The Robert H. Pinnix Scholarships are awarded annually to two upperclassmen enrolled in the Duke School of Engineering. The award is based upon demonstrated ability, excellence in engineering, and financial need.

Scholarships for Foreign Students. A limited number of awards will be made each year to qualified students from other countries who enter as freshmen. Candidates for these awards are required to submit the Application for Scholarship and Financial Aid and the Financial Aid Application for Foreign Students provided by the Office of Undergraduate Financial Aid of Duke University. Two named awards are awarded to currently enrolled foreign students: the Carol Cranmer Scholarship (named for a former student) and the Roberta Florence Brinkley International Scholarship (named for a former Dean).

The Mary Duke Biddle Scholarship in Music Composition. This scholarship with a stipend of \$3,500 per year is available to a member of each entering class. It is renewable from year to year so long as the student meets the required standards for renewal. Students wishing to apply for this award will be required to submit examples of their composition. Eligibility is limited to students planning to major in music.

Air Force ROTC College Scholarship Program. Students can apply for three-year scholarships during their freshman year and two-year scholarships during their sophomore year. Scholarships are available to students who qualify for flight training and to students who major in certain scientific or engineering fields. The scholarships include tuition, fees, and textbook reimbursement, plus a \$100 per month tax-free allowance.

Army ROTC Scholarship Program. All freshman and sophomore students are eligible to apply for Army ROTC scholarships. Awarded without regard to academic major, these grants pay tuition, fees, and textbook/equipment costs in addition to providing a tax-free monthly stipend of \$100 for the balance of the student's normal period to graduation. Commissioned service, following graduation, can be either on active duty or with the reserve forces. Additional information concerning Army ROTC scholarships is available from the professor of military science.

Navy ROTC College Scholarship Program. This program provides for up to four years' tuition and textbooks, laboratory fees, and a \$100 per month stipend. These scholarships, based upon academic achievement, leadership potential, and overall performance, can be awarded at any stage of the student's college career through either a nationwide selection process or by the Professor of Naval Science at the University. In addition, two other two-year scholarships are available to rising juniors: one leads to a career in nuclear power, and the other follows a summer attendance at the Naval Science Institute at Newport, Rhode Island. For further information on any of the above scholarship programs, contact the professor of naval science.

The Minnie Happer Pruden Scholarships. These scholarships of \$1,000 are available to the daughters of Episcopal clergymen.

The Huguenot Scholarship. One scholarship of \$1,000 per year is available from the Huguenot Society of America to a descendant of a Huguenot.

Reginaldo Howard Scholarships. These scholarships, awarded annually to freshman minority students, are provided to honor the late Reggie Howard, first black president of the student government. Seven scholarships for \$6,000 are awarded each year. Scholarships are available for the four years of undergraduate study as long as the student maintains the academic average specified for renewal.

The Anne McDougall Memorial Award. The Anne McDougall Memorial Award for Women is awarded each year to one woman student studying psychology or a related field. Administered through women's studies, this \$1,000 award is intended to provide encouragement and support for women who wish to pursue academic study and continue in the area of human service.

Alumni Endowed Scholarships. Two \$5,000 per year Alumni Endowed Undergraduate Scholarships are awarded to students who demonstrate superior academic ability and leadership potential. These awards are renewable annually for those meeting the stated requirements. Although not restrictive, preference is given to children of alumni.

Scholarships for North Carolina Residents

The Benjamin N. Duke Scholarship Fund. Established by the Duke Endowment to honor Benjamin N. Duke, this fund is intended to encourage the enrollment of students from North Carolina and South Carolina.

The Benjamin N. Duke Leadership Award. As part of the Benjamin N. Duke Scholarship Fund, these awards recognize and encourage leadership potential and community involvement of students from North and South Carolina. Ten scholarships, valued at 75 percent of tuition, are awarded annually.

The Benjamin N. Duke Scholarship Fund also provides a number of grants which replace the loan portion of need-based awards received by students from North Carolina and South Carolina. This allows need based aid recipients from the Carolinas to graduate debt free following the eight standard semesters of enrollment.

Trinity Scholarships. Awarded to North Carolinians of exceptional ability, these scholarships are named to honor the fact that Duke University was originally named Trinity College. Trinity scholarships provide each winner an award equal to the value of tuition, fees, room, board, and the cost of a summer of study abroad.

North Carolina Math Contest. Upon enrolling at Duke, the top two students finishing in the top ten in the North Carolina Math Contest are eligible to receive a scholarship equal to the amount of tuition. This scholarship is available for each of the four years of undergraduate enrollment as long as the student maintains the specified average. Winners must have applied to and been accepted by Duke University.

North Carolina Writer's Contest. Among the top ten finishers in the state writing contest the top two matriculating at Duke will be eligible for full tuition scholarships. To receive these scholarships the winners must have

already applied to and been admitted to Duke University. Each scholarship is available for the four years of undergraduate study as long as the student maintains the required average.

Duke North Carolina Scholars Awards. Scholarships funded by Duke University are awarded annually to select incoming freshmen from North Carolina. Scholarships are renewable for the four years of undergraduate study as long as the student maintains the required average. Scholarships are valued at \$3,000.

The Perry Family Scholarship. Awarded to students from Winston-Salem and the Forsyth County area, this scholarship is designed to meet one half the cost of tuition. Recipients of the scholarship will be required to demonstrate high academic achievement as well as leadership and/or involvement in extracurricular activities. The scholarship is available for four years if the student meets the specified academic requirements.

J. Welch Harriss Scholarships. Recipients of these scholarships will receive \$1,000 per year without reference to need. If demonstrated need exceeds \$1,000, then the scholarship will be adjusted accordingly. These awards are made to entering freshmen who have achieved outstanding academic records. They are renewable each year as long as the student maintains the required average. Consideration will be given in the following order: (1) students from High Point, North Carolina; (2) students from Guilford County, North Carolina; and (3) students from North Carolina.

Alyse Smith Cooper Scholarships. Each year six or more scholarships of various amounts are awarded to students demonstrating both talent and need. Preference is given to students from Alamance County, North Carolina. Majors in music, particularly students of piano, organ, and voice, receive special consideration.

Braxton Craven Endowed Scholarships. Recipients of these scholarships will receive an amount equal to the current tuition at Duke. Braxton Craven scholars will be chosen on the basis of outstanding academic and extracurricular achievement. First preference is given to Davidson County, North Carolina, residents and second preference to students from North Carolina. The scholarships are approved on a continuing basis, provided that the recipient complies with the specified academic requirements.

The John M. and Sally V. Blalock Beard Scholarship. These scholarships are awarded annually to outstanding students from the Wake County area of North Carolina who major in English or the History of the United States. These awards are based on financial need, scholarship, character, and academic achievement.

The Ellen P. and W. Clay Hamner Scholarship. This scholarship covers the full cost of an academic year as well as providing a stipend to cover a foreign travel learning experience for one summer. This scholarship is available to graduates from public high schools in Georgia, Alabama, or North Carolina with preference to students from single parent families. Criteria include need, academic ability, and character. The scholarship is designed for a student studying in humanities with preference for those students who wish to enter the field of business upon graduation.

North Carolina Legislative Tuition Grant. The North Carolina General Assembly has established a program of tuition grants available to North Carolina residents who are full-time students at private colleges and universities in the State of North Carolina. The grant for each eligible student is \$1,050 per year. Applications will be mailed to all eligible students during the summer. In the case of a need-based financial aid recipient, this grant reduces a student's tuition and therefore his budget. All qualified need-based aid recipients are required to apply for this grant.

State Contractual Scholarships for Needy North Carolinians. Funds provided by the State of North Carolina through the Legislative Grant Program are distributed to needy North Carolinians qualifying for the State Contractual Scholarship Program. Application is made through the College Scholarship Service's Financial Aid Form.

Employment. Duke University offers subsidized employment opportunities to many students not qualifying for need based financial aid. Interested students should submit the Financial Aid Form to the College Scholarship Service.

Loans. The loan programs which are available to students through Duke University are listed below:

Perkins Loan. Loan funds supplied by the federal government and Duke University through Part E of Title IV of the Higher Education Act of 1965 are available to qualified students. Repayment of loans under this act normally begins nine months after the student is graduated or leaves college, with complete payment scheduled within a ten-year period. Interest accrues at the rate of 5 percent annually, commencing nine months after the borrower ceases to be at least a half-time student at an institution of higher education. This loan is part of the student's financial aid award.

Guaranteed Student Loan Program. Loans under the Guaranteed Student Loan (GSL) program are available from banks or other incorporated state lending agencies. Duke University can arrange an alternate lender for students who are unable to obtain GSLs through their home state agencies or local banks. Need as established by the federal government's formula will be considered in the University's decision regarding GSL applications. The limit on a GSL, which has an interest of 8 percent for the first four years of repayment and 10 percent for the balance of the repayment period, is \$2,625 for freshmen and sophomores and \$4,000 for upperclass students a year. Repayment begins six months after the student leaves school.

Students may apply for GSL funds by submitting a loan application directly to the Financial Aid Office. In addition, loan applicants must submit the Financial Aid Form to the College Scholarship Service. Additional

information about this loan program may be obtained from the Undergraduate Financial Aid Office.

Parents' Loan for Undergraduate Students Program. Parents may borrow up to \$4,000 through the Parents' Loan for Undergraduate Students (PLUS) program. Repayment of these loans begins sixty days after loan disbursement. Interest is based upon treasury bill rates but will be no higher than 12 percent and begins to accrue at the point repayment begins. Interested parents should contact their home state lending agency.

Supplemental Loans for Students. Under the Supplemental Loans for Students (SLS) Program, independent undergraduate students are eligible to borrow up to \$4,000 per academic year at an interest rate between 12 and 14 percent. Repayment of the principal begins after the student is out of school six months, while interest payments are not deferred and are paid quarterly.

Share Loans. "Share" is a supplemental educational loan program developed specifically to help families meet the costs of higher education. Credit-worthy families, regardless of income, may be eligible to borrow through this program. Annual loan amounts range from \$2,000 to \$15,000 per year with a cumulative borrowing limit of \$60,000. The interest rate is variable, and Share offers several repayment options.

Children of Methodist Ministers. Children of ministers in the North Carolina and the Western North Carolina Annual Conferences of the United Methodist Church may be eligible to receive a partial tuition grant of \$750 per semester for a maximum of eight semesters of undergraduate study at Duke University. Eligibility is met by the parent being in a regular pastoral appointment and resident in one of the conferences. When the parent is in a special appointment and resident in one of the conferences, eligibility will be determined on an individual basis, depending upon the nature of the appointment. In all cases the decision of the University will be final.

Employment. Most financial aid recipients are offered a job as part of their aid package. These jobs require between ten and fourteen hours a week and provide an average stipend of \$1,500. The money is paid directly to the student. The Office of Undergraduate Financial Aid maintains part-time employment listings for the campus and Durham area. All students interested in working during the school year should inquire at the Financial Aid Office at the beginning of the semester. Every effort will be made to help students find jobs consistent with their interests.

Duke University also expects that students receiving financial aid will work during the summer. In the year before entering college, a freshman should save \$1,100 for use during the first year of college. In subsequent years, the student should save \$1,300 to be used for college expenses. These figures are viewed as estimates and are revised consistent with actual earnings.

Tuition Plans. Many families finance a college education with the assistance of an insured tuition payment plan regardless of whether they receive financial assistance from Duke. Although these plans are sponsored by a number of private firms, the University refers parents to plans provided by the Richard C. Knight Insurance Agency, Inc. The company provides the University with the full sum required each semester and arranges a schedule for monthly repayment by the subscribing families. The schedules for repayment vary with the program offered by the company. Additional information on this particular tuition payment plan may be obtained by writing to Richard C. Knight Insurance Agency, Inc., Insured Tuition Payment Plan, 53 Beacon Street, Boston, Massachusetts 02108.

Tuition payment plans are also available through the Tuition Plan, Concord, New Hampshire 03301. Each year the Tuition Plan will send information to all students.

Courses of Instruction



Definition of Terms

Courses taught in 1986-87 or in 1987-88 or scheduled for 1988-89 are included in this chapter with full descriptions. Additional courses, which were taught prior to 1986-87 and are likely to be taught in the future, are listed separately by number and title only under the heading Courses Currently Unscheduled. For courses which will be offered in 1988-89, consult the *Official Schedule of Courses*.

Introductory level courses are numbered below 100; advanced level courses are numbered 100 and above. Courses numbered 1 through 49 are primarily for freshmen; courses numbered from 200 through 299 are primarily for seniors and graduate students. (See the section on course load and eligibility in the chapter "Academic Procedures and Information.")

Odd-numbered courses are usually offered in the fall semester; even-numbered courses in the spring semester. Double numbers separated by a hyphen indicate that credit is contingent upon completion of both courses. Double numbers separated by a comma indicate that although the course is a year course, credit may be received for either course or both courses.

The following symbols, suffixed to course numbers, identify the small group learning experiences: *S*, seminar; *P*, preceptorial; *T*, tutorial; *D*, discussion section. The *L* suffix indicates that the course includes laboratory experience. *C-L*: denotes a course that is cross-listed or a program under which a course is listed.

The following portion of this bulletin, arranged alphabetically, includes courses of departments, programs, and institutes, as well as categories of courses. Details are provided in the individual entries, which indicate whether a major is available in that particular field. A certificate, offered in some programs, is not a substitute for a major but is a supplement, confirming that a student has satisfied the requirements of that program.

Trinity College of Arts and Sciences

Professor White, *Dean of Arts and Sciences and of Trinity College*; Associate Professor Eldridge, *Associate Dean*; Assistant Deans Bryant, Lattimore, Nathans (Director of the Premajor Advising Center), Nijhout (Director of Health Professions Advising), Roach, Weller, Wilson, and Wittig

Aerospace Studies—Air Force ROTC (AS)

Professor O'Connor, Colonel, USAF, *Chairman*; Visiting Assistant Professor Smith, Captain, USAF, *Director of Undergraduate Studies*; Visiting Assistant Professors Riley, Major, USAF, and Snoddy, Captain, USAF

Eligibility Requirements. All freshmen and sophomores, men or women, are eligible to enroll in the General Military Course in the Air Force Reserve Officer Training Corps. For enrollment in the Professional Officer Course, the student must have completed successfully either the General Military Course or the six-week field training course; must execute a written agreement with the government to complete the Professional Officer Course; must be sworn into the enlisted reserve; and must agree to accept a commission in the U.S. Air Force Reserve upon graduation. In addition, each student must take at least one course in mathematical reasoning prior to graduation/commissioning. All students also will be required to attend one hour of leadership laboratory each week. All courses, except 2L, are open to all students with consent of instructor.

General Military Courses

First Year

1. The Air Force Today. Development of aerospace power in the United States; mission, doctrine, and organization of the U.S. Air Force and its relationship to the other services within the Department of Defense. (May not be counted to satisfy graduation requirements.) Half course. *O'Connor*

2L. Leadership Laboratory. Instruction in drill and ceremonies, wearing the uniform, giving commands, and other leadership activities. Mandatory for all Air Force ROTC cadets. Must be repeated each semester. Pass/fail grading only. No credit. *Staff*

Second Year

51. Development of Air Power. Growth and development of air power from dirigibles and balloons to the present emphasizing evolution of concepts and doctrine governing air power employment in support of national objectives. (May not be counted to satisfy graduation requirements.) Half course. *Snoddy*

Professional Officer Courses

All students selected to continue aerospace studies pursue the following courses:

Third Year

105S. Aerospace Leadership and Management. An introduction to management fundamentals to include the knowledge base and process of managing. One course. *Riley*

106S. Aerospace Leadership and Management. Application of management fundamentals to duties as junior officers/executives to include principles of leadership. One course. *Riley*

Fourth Year

205S. National Security Forces in Contemporary American Society. The role of the professional military officer in a democratic society and the environment in which national security policy is formulated. One course. *Smith*

206S. National Security Forces in Contemporary American Society. The evolution of U.S. nuclear strategy, the international context in which national security policy is implemented, and the military justice system. One course. *Smith*

Afro-American Studies Program (AAS)

A major is available in this program.

The program in Afro-American Studies provides instruction directed toward the experience and concerns of black America. The courses encompass the black experience in America and the black experience as illuminated by literary, religious, and cultural

evidence generated by black Americans. The courses in the program are essential components of a liberal arts education and may constitute a major or complement another major. In addition to the courses listed below, many related courses are offered. Descriptions can be found under the Departments of Anthropology, Economics, History, Political Science, Public Policy Studies, Religion, and Sociology. Swahili courses are described under Asian and African Languages. Further information is available in 111 Allen Building.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

56. The Black Religious Experience in America. See C-L: Religion 56. One course. *Lincoln*

74. Introduction to Jazz. See C-L: Music 74. One course. *Jeffrey*

116. Race and Ethnic Relations. See C-L: Sociology 116. One course. *Staff*

138. Political Leadership in the Black Church. See C-L: Religion 138. One course. *Lincoln*

144. Black Cults and Sects in America. See C-L: Religion 144. One course. *Lincoln*

145, 146. Afro-American History. See C-L: History 145, 146. One course each. *Gavins*

173, 174. Afro-American Literature. See C-L: English 167, 168. One course each. *K. Williams*

213S. Economics of Slavery in the American South. Prerequisites: Economics 149 and consent of instructor. See C-L: Economics 213S. One course. *Coats*

265. Religions of the West Africa Diaspora. See C-L: Religion 265; also C-L: Comparative Area Studies. One course. *Lincoln*

THE MAJOR

Eight courses are required for the major. The course of study for each student is planned by the student and the student's adviser in the light of the student's interests and goals.

Anthropology (AN)

Associate Professor Glander, *Acting Chairman*; Associate Professor Domínguez, *Director of Undergraduate Studies*; Professors Apte, Cartmill, Fox, O'Barr, and Simons; Associate Professors Hylander, Quinn, and Smith; Assistant Professor Wright; Professors Emeriti Friedl and La Barre; Adjunct Associate Professors Kay (anatomy) and Stack (public policy studies); Adjunct Assistant Professor Weller

A major is available in this department.

Anthropology is a comparative discipline which studies the world's peoples, cultures, and the physical evolution of humanity. It emphasizes the application of the perspectives which anthropology developed from its initial concentration on the prehistoric and primitive world to studies of complex societies including rural, urban, and ethnic segments of the Third World and contemporary industrial nations.

Anthropology is divided into four subdisciplines: cultural anthropology, physical anthropology, archaeology, and linguistics. Cultural anthropologists study development and change in the form and the process of social organization among contemporary human populations. Physical anthropologists study the origin and development of humans. Their major emphasis is the study of fossils, genetic processes, and nonhuman primates. Archaeologists concern themselves with events and processes of the human unwritten

past. Anthropological linguists work with languages of the present and past and trace the relationship between language and culture. The department offers courses in all four subdisciplines.

Students without prerequisites for a course may ask the instructor for admission.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

93. Human Origins. Origins and distribution; primate evolution; a survey of human paleontology and human biology, prehistory, and language; and the origins of human social organization and culture. One course. *Staff*

93D. Human Origins. Same as Anthropology 93 except instruction is provided in two lectures and one small laboratory meeting each week. One course. *Staff*

94. Introduction to Cultural Anthropology. The dynamics of culture and society; form and function of social institutions. Emphasis upon primitive and complex societies. C-L: Comparative Area Studies. One course. *Staff*

94S. Introduction to Cultural Anthropology. See Anthropology 94. C-L: Comparative Area Studies. One course. *Staff*

101, 102. Introduction to the Civilizations of Southern Asia. See C-L: Interdisciplinary Course 101, 102; also C-L: Comparative Area Studies; History 193, 194; and Religion 160, 161. One course each. *Apte or Fox*

105. History of Anthropology. Introduction to the origins and development of anthropology as a professional discipline in the Western world, with emphasis on cultural anthropology. Cultural milieu in America, Britain, and France and its effects on the subsequent professionalization and institutionalization of the discipline. One course. *Fox*

107. Introduction to Linguistics. Origin and nature of language; methods of descriptive linguistics with reference to historical and comparative linguistics. C-L: English 111, Interdisciplinary Course 111, and Linguistics. One course. *Butters, Nygard, or Tetel*

109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Comparative Area Studies, History 109, Interdisciplinary Course 109, Political Science 160, Religion 156, and Sociology 175. One course. *Staff*

110. Advertising and Society. History and development of commercial advertising; advertising as a reflector and/or creator of social and cultural values; advertisements as cultural myths; effects on children, women, and ethnic minorities; advertising and language; relation to political and economic structure; and advertising and world culture. Primary emphasis on American society with consideration of selected other cultures. C-L: English 120, Sociology 160, and Women's Studies. One course. *O'Barr, J. Smith, or Wilson*

111. Anthropology of Law. Law in the social and cultural context of non-Western and Western societies. Comparative study of substance and procedure of law in selected cultures. One course. *O'Barr*

112. Current Topics in Linguistics. Advanced study of an area of linguistics or grammar. C-L: English 119, Interdisciplinary Course 119, and Linguistics. One course. *Staff*

113. The Cultural Construction of Gender. Explanation of differing gender beliefs cross-culturally. Comparison of these belief complexes with dominant Western themes about gender, as reflected in Western history, in contemporary ideological struggles, and most especially, in gender origin myths constructed by Western social scientists. C-L: Women's Studies. One course. *Quinn*

114. Gender Inequality. Universalistic theories of gender inequality posited on biological sex differences and differences in early psychological experience. Evolutionary

theories that point to the existence of egalitarian societies and the appearance of gender inequality only with the emergence of ranking, stratified societies. The rise of the state; examination of the form of gender inequality in state societies. C-L: Comparative Area Studies and Women's Studies. One course. *Quinn*

118S. The Language of Advertising. Topics include: history and development of the genre of advertising language; comparisons to the specialized language used in medical, legal, and other professional contexts; and relation of topics to sociolinguistic theories and anthropological field methods. Primary focus on American television, print, and radio advertising and consideration of advertising language in certain other cultures. Directed field projects. Prerequisite: Anthropology 110 or consent of instructor. C-L: Linguistics. One course. *O'Barr*

119. Language, Culture, and Society. Analysis of language behavior within and across societies relating variations in linguistic usage to sociocultural factors: ethnosemantics, social dialects, and ethnography of speech. Prerequisite: Anthropology 94. C-L: Comparative Area Studies and Linguistics. One course. *Apte or Weller*

120. South Asia: Institutions and Change. Indigenous cultures and societies of India, Pakistan, Sri Lanka, Bangladesh, Nepal, and Bhutan with emphasis on social institutions, behavioral patterns, value systems, and sociocultural change. Prerequisite: Anthropology 94. One course. *Apte or Fox*

121. China: Tradition and Transformation. Culture and social life in late imperial China; continuation and transformation in the twentieth century. Topics include religion, kinship and family, the position of women, imperialism, economic change in Taiwan, and the revolution. C-L: Comparative Area Studies. One course. *Weller*

122. Modern Africa. Indigenous cultures and societies of Africa through the study of kinship, politics, economics, religion, and sociocultural change. Prerequisite: Anthropology 94. C-L: Comparative Area Studies. One course. *O'Barr*

124S. The American Indian. The Indians of North and South America; origins and prehistory, archaeology, racial affiliations, languages, material culture, social and political organization, economics, and religion. C-L: Comparative Area Studies. One course. *Staff*

125. Strategies of Comparative Analysis. See C-L: Interdisciplinary Course 125; also C-L: Comparative Area Studies, History 137, Political Science 125, and Sociology 125. One course. *Staff*

126. Middle East: Wars, Revolutions, and Social Change. Political and institutional consequences of different forms of social relations. Topics include male-female relations, tribalism, traditional and experimental forms of family organization, ethnic and national identities and conflicts, and the impact of colonialism and the modern world system on the region. C-L: Comparative Area Studies and Women's Studies. One course. *Domínguez*

127. Social Transformations in Central America. Current issues affecting the peoples of Central America in historical and anthropological perspective; analysis of revolution through the development of distinctive social structures and cultural forms. C-L: Comparative Area Studies. One course. *Smith*

128. Caribbean Societies and Cultures. Social, economic, and political development within the world system; social differentiation, cultural fragmentation, colonialism, and dependence; the effects of slavery; and the Caribbean diaspora. C-L: Comparative Area Studies. One course. *Domínguez*

130. Social and Cultural Change. Contemporary theories of change, including innovation, acculturation, and modernization. Prerequisite: Anthropology 94. One course. *O'Barr or Smith*

131. Socialism and Society in China. The People's Republic of China since 1949: socialist economic development, political life, population control, local community organization, the arts, and dissidence. C-L: Comparative Area Studies and Women's Studies. One course. *Weller*

132. Human Evolution. Evolutionary biology of the primates. Anatomical and behavioral adaptations and phylogeny of fossils and living primates including *Homo sapiens*. Prerequisite: Anthropology 93 or equivalent. One course. *Cartmill, Glander, or Simons*

134. Political Anthropology. Comparative study of politics and government in tribal and peasant societies. Evolution of political systems. Political changes resulting from contact and colonialism. Prerequisite: Anthropology 94. One course. *Domínguez, O'Barr, or Smith*

137. Incest, Adultery, and Other Problems in Kinship and Marriage. Cross-cultural attitudes on human sexuality. Varieties of family life and its integration in the political and economic context of human societies. Prerequisite: Anthropology 94. C-L: Women's Studies. One course. *Domínguez or Quinn*

139. Marxism and Society. A critical appraisal of Marxism as a scholarly methodology for understanding human societies. The basic concepts of historical materialism, as they have evolved and developed in historical contexts. Topics include sexual and social inequality, alienation, class formation, imperialism, and revolution. Core course for the program in Perspectives on Marxism and Society. C-L: Education 139, History 186, Interdisciplinary Course 139, and Sociology 139. One course. *Fox or J. Wilson*

141. The Self and Others: Ethnic, Racial, and Social Classifications. The nature of human social identities, the contexts in which they are shaped, and the processes by which they change; emphasis on ethnic, racial, and gender identities. C-L: Women's Studies. One course. *Domínguez*

143. Primate Biology. A comprehensive survey of primate feeding strategies and general ecology. One course. *Glander or Simons*

144. Evolutionary Study of Behavior. Phylogenetic comparison of communication, infant socialization, aggression, and sexual behavior as they pertain to species group structure. Emphasis on primates. One course. *Glander or Simons*

145. Medical Anthropology. Evolution and disease; theories of disease and healing; and factors influencing behavior in health and illness. One course. *Weller*

146. Sociobiology and Gender. Sociobiological theory reviewed and applied to the social behavior of free-ranging primates. The effects of gender on social behavior. One course. *Wright*

147, 148. Introduction to Islamic Civilization. Prerequisite: consent of Director of Undergraduate Studies. See C-L: Interdisciplinary Course 162, 163; also C-L: Comparative Area Studies; History 101G, 102G; and Religion 162, 163. One course each. *Lawrence and staff*

151. Culture and Thought. The role of culture in the organization of knowledge for the performance of everyday cognitive tasks and of thematic knowledge for the broader purposes of living, such as understanding oneself and others' behavior and pursuing one's life goals. One course. *Domínguez or Quinn*

152S. Food in Cross-Cultural Perspectives. The behavioral, institutional, linguistic, religious, and ideological aspects in relation to the production, distribution, and consumption of food within and across cultures. C-L: Comparative Area Studies. One course. *Apte*

155. Anthropological Approaches to Religion. Cross-cultural perspectives on the relationship of religion to experience, behavior, conflict, and change. C-L: Comparative Area Studies. One course. *Weller*

158S. Cross-Cultural Studies of Humor. Sociocultural basis, nature, scope, and function of humor. Prerequisite: Anthropology 94. One course. *Apte*

160S. Anthropology and Literature. The interrelationships of literature, both oral and written, and social structure and cultural patterns. Special emphasis on oral literature. C-L: Comparative Area Studies. One course. *Apte*

163. Foundations of Chinese Civilization. The contemporary experience in China and its relation to ethnic, spiritual, social, aesthetic, moral, political, and economic themes in China's past. (Taught in China.) C-L: Comparative Area Studies and History 163. One course. *Staff*

166. Introduction to Archaeology: Humans and Culture. Modern methodology and analysis, theories of cultural evolution, and survey of world prehistory with an exploration of the uses of ethnographic analogy. One course. *Staff*

167. Prehistoric Technology. Procurement of raw materials, manufacturing of objects, and the usage of these objects in archaeological context. One course. *Staff*

168. Beginnings of Civilization. Cultural developments from the beginning of agriculture to the rise of civilization in Africa, Mesoamerica, Peru, India, Southwest Asia, and China, using archaeological and ethnographic examples. C-L: Women's Studies. One course. *Staff*

172S. Primate Anatomy. The comparative anatomy of primates from the perspective of adaptation and phylogeny. Laboratory includes some dissection or prosection of human and nonhuman primates. One course. *Kay*

173. Revolutions in Latin America. Social, economic, political, and ideological circumstances that generate revolutions in twentieth-century Latin America. Prerequisite: consent of instructor. C-L: Comparative Area Studies. One course. *Smith*

180. Current Issues in Anthropology. Selected topics in methodology, theory, or area. One course. *Staff*

180S. Current Issues in Anthropology. Same as Anthropology 180 except instruction is provided in seminar format. One course. *Staff*

185. Current Issues in Primatology. Selected topics in primate behavior, ecology, and conservation. One course. *Glander or Wright*

186. Research Internship in Primatology. Prerequisite: consent of instructor. See C-L: Interdisciplinary Course 186. One course. *Staff*

187S. Senior Seminar in Primatology. Prerequisite: consent of instructor. See C-L: Interdisciplinary Course 187S. One course. *Staff*

193. Independent Study. Directed reading and research. Open only to qualified seniors, with consent of Director of Undergraduate Studies. One course. *Staff*

195S, 196S. Senior Seminar. Prerequisites: Anthropology 94, a 100-level course in anthropology, and consent of Director of Undergraduate Studies. One course each. *Staff*

For Seniors and Graduates

201S. Marxism and Anthropology. The interaction of Marxist and anthropological theory over the last half century; particular attention to evolution, historical transfor-

mation, mode of production, labor processes, culture, ideology, and consciousness. One course. *Smith*

206S. Current Theoretical Schools in Anthropology. The theoretical schools since World War II, including cultural materialism and neo-Marxism, structuralism, cognitive anthropology, cultural analysis and symbolic anthropology, transactional analysis, and sociobiology. Prerequisite: Anthropology 94 or graduate standing or consent of instructor. One course. *Apte, Domínguez, Fox, O'Barr, Quinn, Smith, or Weller*

211S. Ethnography of Communication. History of the mutual influence of linguistics and anthropology leading to the development of ethnography of speaking, ethno-science, structuralism, and sociolinguistics. Topics vary each semester. Prerequisite: Anthropology 107 or 119. C-L: Linguistics. One course. *Apte, Domínguez, Fox, O'Barr, Quinn, Smith, or Weller*

215S. The Anthropology of Women: Theoretical Issues. Topic to be selected each semester from: gender ideology, women and work, gender inequality, the history of feminist anthropology, or others. C-L: Women's Studies. One course. *Domínguez, Quinn, or Smith*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Comparative Area Studies, History 234S, Interdisciplinary Course 234S, and Sociology 234S. One course. *Bergquist, Fox, Gereffi, or Smith*

239. Culture and Ideology. Major theories about the relation between ideologies and social/economic systems. Readings from the works of Marx, Weber, Gramsci, Althusser, Geertz, and others. C-L: Comparative Area Studies. One course. *Weller*

241. The Rise of Civilization in Mesopotamia and Iran. An introductory survey of the major stages of development from the beginnings of agriculture to the collapse of the early state-system (10,000-1,800 B.C.E.). Archaeological and textual evidence, focusing on the rise of the Mesopotamian state-system, the nature of that system, and the mechanisms leading to its collapse. C-L: Women's Studies. One course. *Staff*

243S. Theory and Method in Archaeology. Techniques of geochronology, environmental reconstruction, sociocultural reconstruction, and statistical analyses applied to problem areas in archaeology. Prerequisite: Anthropology 166. One course. *Staff*

244S. Primate Behavior. Social behavior of prosimians, monkeys, and apes and the evolutionary development of primates. One course. *Glander*

246S. The Primate Fossil Record. Evolution of humans and other primates as inferred from fossil remains. Prerequisite: a course in human evolution. C-L: Anatomy 246S. One course. *Simons*

251S. American Marriage: A Cultural Approach. Individual research on the American cultural model of marriage. Collection, transcription, and analysis of how individuals adapt it to understanding their own experiences. C-L: Women's Studies. One course. *Quinn*

255S. Heroes and Heroics: Culture and the Individual. Can great men or women change the course of cultures? Or are even those we call geniuses and heroes simply carriers of their culture? The relationship between individuals and their cultures as portrayed in anthropology and related disciplines. Various approaches to the lives of selected heroes, using M. K. Gandhi as an exemplar. C-L: Comparative Area Studies. One course. *Fox*

258S. Symbols in Society. Symbolic action and expressive culture among tribal, peasant, and industrial societies. Approaches emphasized are functionalism, symbolic inter-

action, structuralism, and cultural interpretation. One course. *Domínguez or Weller*

267. Cognitive Anthropology. The organization of culturally shared knowledge; cognitive tasks such as categorizing, decision making, problem solving, and reasoning. One course. *Quinn*

272S. Marxism and Feminism. Introduction to the theoretical literature and debates linking Marxism and feminism. Prerequisite: consent of instructor. C-L: Women's Studies. One course. *Smith*

280S, 281S. Seminar in Selected Topics. Special topics in methodology, theory, or area. Prerequisite: consent of instructor. One course each. *Staff*

282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Canadian Studies, Comparative Area Studies, History 282S, Political Science 282S, and Sociology 282S. One course. *Cahow*

COURSES CURRENTLY UNSCHEDULED

99. Perspectives in Archaeology

116. Language, Ethnicity, and New Nations

123. Societies of Mediterranean Europe

129. The Black Experience in the Americas: Roots and Directions

133. The Effects of Colonialism and Neocolonialism on Native Peoples

135. American Culture: Research and Analysis

136S. Cross-Cultural Studies of Socialization

140. The Anthropology of Race

142. Anthropology and Cultural Bias

156. The Politics of Ritual Performance

159. Language and the International Order

164. Peasantry and Peasant Movements

165. Psychological Anthropology

170. Economic Anthropology

189. The Americas: A Survey of the Forces Shaping the Hemisphere

204S. The Anthropology of Cities

205. The Anthropology of Anthropology

228S. Slavery and Society

237S. Interpretations of Kinship

275S. Inequality in Precapitalist Societies

ANTHROPOLOGY COURSES BY FIELDS OF CONCENTRATION

Anthropology courses for undergraduates are offered in four fields, as noted below. Students majoring in anthropology are expected by the time of their graduation to have completed a concentration in one of the four fields.

Social-Cultural Anthropology. Anthropology 49S, 101, 102, 105, 109, 110, 111, 113, 114, 122, 129, 130, 133, 134, 135, 136S, 137, 139, 140, 141, 142, 145, 147, 148, 151, 152S, 155, 156, 158S, 160S, 164, 165, 170, 173, 180, 180S, 189,

195S, 196S, 201S, 204S, 205, 206S, 215S, 228S, 234S, 237S, 239, 251S, 255S, 267, 272S, 275S, 280S, 281S. Courses on major world areas: Anthropology 120, 121, 123, 124S, 126, 127, 128, 131, 163, 282S.

Linguistic Anthropology. Anthropology 107, 112, 116, 118S, 119, 159, 211S, 258S.

Physical Anthropology. Anthropology 132, 143, 144, 146, 172S, 185, 186, 187S, 244, 246.

Archaeology. Anthropology 99, 166, 167, 168, 241, 243.

THE MAJOR

The major in anthropology is offered under the Bachelor of Arts degree.

Major Requirements. Eight courses in the department, two of which must be 93 and 94. Concentration in one of the four fields of the discipline must be accomplished by completing a minimum number of courses designated for the chosen field. The remaining courses to complete the required eight may be selected from other departmental offerings, either in the field of concentration or in other fields. Courses in each field of concentration are listed above, and the concentration requirements for each field follow:

Social-Cultural Anthropology Concentration. At least three courses selected from the departmental offerings in Social-Cultural Anthropology, one of which must be a course from the list dealing with the cultures and societies of a major world area.

Linguistic Anthropology Concentration. At least three courses selected from the departmental offerings in linguistics, one of which must be 107 or 119.

Physical Anthropology Concentration. At least three courses selected from the offerings in physical anthropology, one of which must be 132.

Archaeology Concentration. At least three courses selected from the departmental offerings in archaeology, one of which must be 166.

Recommended Courses in Anthropology beyond Basic Requirements. Although an anthropology major consists of only eight required courses, students are encouraged to take additional courses both within their concentration and elsewhere in the department. The breadth of the discipline makes this desirable.

Suggested Work in Related Disciplines. Related courses in other departments are strongly advised. Each student's adviser will recommend a program of related work to complement the student's concentration and interests in anthropology.

Honors. Qualified majors are encouraged to participate in special work leading to graduation with distinction in anthropology. See the section on honors in this bulletin for general requirements. Any major with a *B+* average (3.3 gpa) in anthropology courses and with a *B* average (3.0 gpa) in all courses is eligible. Students who desire to undertake honors work should request a member of the anthropology faculty to recommend their names to the Director of Undergraduate Studies. To receive departmental honors a major must complete a paper involving significant independent research or scholarship and pass an oral examination on the paper conducted by an appointed committee of faculty members, at least two of whom should be in anthropology. Normally, students will prepare their papers over the course of the senior year working in close collaboration with their committees and receiving on the average two course credits in independent study for the work.

Arabic

For courses in Arabic, see Asian and African Languages.

Art and Art History (ART)

Professor Goffen, *Chairman*; Associate Professor Bruzelius, *Director of Undergraduate Studies*; Professor Spencer; Associate Professors Pratt and Wharton; Assistant Professors Castriota and Sund; Professors Emeriti Hall, Jenkins, Markman, and Sunderland; Adjunct Professors Lee and Mezzatesta; Artists-in-Residence Noland and Shatzman; Part-time Instructor Smith

Majors in Art History and Design are available in this department.

HISTORY OF ART

Art history is intellectual history, providing students from all academic disciplines the opportunity to strengthen their powers of perception and expression and to bring together their various interests and different kinds of learning experiences. Art history is the study of works of art in their historical context, that is, in the context of their cultural, religious, philosophical, and sociological conceptions. Studying art history develops the ability to evaluate and organize different kinds of information, and it enhances the faculties of creative imagination, precise observation, clear expression, and critical judgment. Students of art history acquire an appreciative awareness of the great aesthetic achievements of mankind and a sense of our cultural heritage.

A major or second major in art history is the appropriate training for students interested in teaching or scholarship in the history of art, in working in galleries or museums, or in art publishing. Art history is also an excellent preparation for those planning careers in medicine, law, or other professions.

69, 70. Introduction to the History of Art. The history of western architecture, sculpture, and painting in a cultural context. 69: from prehistory to the Renaissance (c. 1400). 70: from the Renaissance to the present. One course each. *Staff*

114. The Aegean Bronze Age. See C-L: Classical Studies 155. One course. *Younger*

115. Ancient Greece. Prerequisite: Classical Studies 11S, 53, 123, or 124, or History 53, or consent of instructor. See C-L: Classical Studies 147. One course. *Younger*

116S. Athens. See C-L: Classical Studies 161S. One course. *Younger*

117. Pompeii. See C-L: Classical Studies 162. One course. *Staff*

120. The Art of Egypt and the Ancient Near East. Art and architecture of the major urban centers of Egypt, Syria-Palestine, Mesopotamia, and Iran from the fourth millennium B.C. to the conquest of Alexander. Emphasis on architecture, sculpture, and painting. One course. *Castriota*

121. The Art of Ancient Italy. Art and architecture in Italy from the Villanovan period to the late Roman Republic. Emphasis on relations among the Etruscans, early Rome, and the Greek cities of the South. Not open to students who have had Classical Studies 126. C-L: Classical Studies 121. One course. *Castriota*

122. Art and Myth in Ancient Greece. Art in relation to myth in Greek society from the Orientalizing to the Hellenistic period. Emphasis on architectural sculpture and painting; connections between monumental and small-scale arts. C-L: Classical Studies 122. One course. *Castriota*

123. Greek Art and Archaeology I. See C-L: Classical Studies 123. One course. *Younger*

124. Greek Art and Archaeology II. See C-L: Classical Studies 124. One course. *Younger*

125. The City in Antiquity. Urban architecture and city planning in the ancient Near East and the classical world. Forms and development of the urban environment as a function of religious, political, and economic factors from the beginnings of Mesopotamia to the centers of Hellenistic Greece and the Roman Empire. C-L: Classical Studies 125. One course. *Castriota*

126. Rome: History of the City. See C-L: Classical Studies 145. One course. *Boatwright or Burian*

128. Art of the Roman Empire. Art and architecture in the Roman world from Augustus to Theodosius. Emphasis on portraiture, private arts, and triumphal monuments. Not open to students who have had Classical Studies 126. C-L: Classical Studies 128. One course. *Castriota*

129. The Age of Justinian. Sixth-century monuments—Hagia Sophia, the mosaics of Ravenna, the icons of Sinai—as the culmination of late antique classical culture and the initiation of the Christian middle ages; the social and historical context as seen in the writings of Procopius, Paul the Silentiary, and Romanus the Melode. C-L: Classical Studies 129 and Medieval and Renaissance Studies. One course. *Wharton*

130. Late Antique and Early Christian Art. Mediterranean arts and architecture from the second to sixth century A.D. The development of Christian art in Roman society. One course. *Wharton*

131. Byzantine Art and Architecture. Stylistic and structural developments in architecture, mosaics, frescoes, and icons in Byzantium from iconoclasm to the fall of Constantinople (ninth to fifteenth century), considered with their cultural context. C-L: Classical Studies 131. One course. *Wharton*

132. Romanesque Art. Western European art and architecture from the mid-tenth through the twelfth centuries. Influence of monasticism, the Crusades, and pilgrimages on the arts. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

133. Gothic Art. Western European art and architecture of the High Middle Ages to the early fifteenth century. Emphasis on the French contribution to the development of Gothic style. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

134. Medieval Architecture. The development of medieval architecture through the mid-fourteenth century. Emphasis on churches, with some discussion of castles and fortifications, town planning, and domestic architecture. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

135. Gothic Cathedrals. Major monuments of Gothic architecture in the twelfth and thirteenth centuries on the continent and in England with concentration on the great cathedrals of France. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

136. Gothic Cathedrals. Same as Art 135, but taught in French. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

137. The Twelfth Century. The climax of Romanesque style and the emergence of the Gothic in western European art and architecture from A.D. 1100 to 1200. Emphasis on the transformation of medieval art and society through the growth of urban life and the rise of monarchy. C-L: Medieval and Renaissance Studies. One course. *Staff*

140. Giotto and the Origins of the Renaissance. Painting and sculpture in Italy, with emphasis on Pisano, Duccio, Giotto, and the crisis of the Black Death. C-L: Medieval and Renaissance Studies. One course. *Goffen*

141. Fifteenth-Century Italian Art. Painting, sculpture, and architecture from Masaccio, Donatello, and Brunelleschi to Leonardo. Emphasis on the art of Florence. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

142. Sixteenth-Century Italian Art. Painting and sculpture in Rome and Florence: Michelangelo, Raphael, Leonardo. The rise and diffusion of mannerism: Pontormo to Tintoretto. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

145. Renaissance Art in Florence. Painting, sculpture, and architecture from Giotto to Michelangelo based on the works of art preserved in Florence. Emphasis on individual

artists and their creations and on the relation of the artists to the society of their times. Closely integrated with History 182. (Taught in summer program in Italy.) One course. *Spencer*

146. Italian Renaissance Architecture. Development of building types and city planning in the fifteenth and sixteenth centuries in central and northern Italy. Emphasis on Brunelleschi, Alberti, Bramante, Michaelangelo, and Palladio. C-L: Medieval and Renaissance Studies. One course. *Spencer*

147. Venetian Art: Fifteenth Century to the Eighteenth Century. Painting, sculpture, and architecture. Emphasis on Bellini, Giorgione, and Titian; the primacy of color; and the major themes of Venetian art: religion, politics, and sensuality. C-L: Medieval and Renaissance Studies. One course. *Goffen*

148. Art of the Netherlands in the Fifteenth Century. Early Netherlandish painting with an emphasis on the innovations of the Master of Flémalle, Jan van Eyck, Rogier van der Weyden, and Hugo van der Goes; courtly and civic patronage of the visual arts in the cities of Flanders and Brabant; the cult of oil-based pigments and paintings as a mirror of nature. C-L: Medieval and Renaissance Studies. One course. *Staff*

150. Prints in the Fifteenth, Sixteenth, and Seventeenth Centuries. The formats and functions of prints in Italy, Germany, and the Netherlands. Status of a replicative medium, notions of technical virtuosity, the conceit of a deceiving likeness, emblems, and the structure of title pages. Emphasis on Marcantonio Raimondi, Dürer, Goltzius, the Rubens workshop, and Rembrandt. C-L: Medieval and Renaissance Studies. One course. *Staff*

151. Art of Italy in the Seventeenth Century. Caravaggio, the Carracci, Guido Reni, Domenichino, Bernini, and Poussin. Modes of description and narration; the concern with the status of pictorial representation; and the attempts to define and retrieve the canonical achievements of the early sixteenth century. One course. *Staff*

152. Art of the Netherlands in the Sixteenth Century. Introduction of new pictorial formats and functions in Netherlandish prints and paintings at the turn of the sixteenth century; Floris, Bruegel, and the definition of native idioms in the circle of Abraham Ortelius in Antwerp; the Haarlem community of engravers and theoreticians and the formulation of a history of Northern art at the close of the sixteenth century. C-L: Medieval and Renaissance Studies. One course. *Staff*

153. Art of the Netherlands in the Seventeenth Century. The descriptive subject categories and the alternative modes of representation formulated by Rubens, Rembrandt, and Vermeer. One course. *Staff*

160. Rococo to Neoclassicism: Eighteenth-Century European Art. Major developments in painting, sculpture, architecture, and the landscape garden in eighteenth-century France, Italy, England, and Germany. Among the artists considered are Watteau, Hogarth, Chardin, Fragonard, Tiepolo, Piranesi, Gainsborough, and David. C-L: Comparative Area Studies. One course. *Staff*

161. Nineteenth-Century European Art. Painting and sculpture of leading artists within the movements of neoclassicism, romanticism, impressionism, and symbolism. C-L: Comparative Area Studies. One course. *Sund*

162. American Art from Colonial Times to 1900. The development of an American national school in portraiture, history painting, landscape, genre scenes, and still-life. Major figures include Copley, Bingham, Cole, Church, Whistler, and Eakins. One course. *Sund*

163. Eighteenth- and Nineteenth-Century Painting in Britain: Hogarth to the Pre-Raphaelites. A survey of British painting from Hogarth to the Pre-Raphaelites, focusing on the establishment of a strong native school in the genres of history painting, narrative subjects, portraiture, sporting art, and landscape. Included among the more important artists are Hogarth, Reynolds, Gainsborough, Stubbs, Blake, Turner, and Constable. One course. *Staff*

164. Art of the Romantic Period. Painting, sculpture, and architecture in France, England, Spain, and Germany from the late eighteenth century to the Revolution of 1848. The relationship of art to politics, changing concepts of genius and originality, the cult of styles, orientalism, and the emergence of landscape as a dominant art form. C-L: Comparative Area Studies. One course. *Staff*

165. Far Eastern Ceramics. C-L: Comparative Area Studies. One course. *Lee*

178. Pre-Columbian Art and Architecture. A survey of the art and architecture of American cultures in Mexico, Central America, and Peru before the Spanish conquest. Particular emphasis on their political and religious functions, including the Olmec, Teotihuacan, Mayan, Aztec, and Inca civilizations. C-L: Comparative Area Studies. One course. *Sund*

181. The New York School: Art of the 1950s. American art after World War II: abstract expressionism and the New York school. Emphasis on improvisation, gesture, and experimentation in the works of Pollock, de Kooning, Rothko, David Smith, Johns, and Rauschenberg. Historical influences and parallels with the other arts. One course. *Staff*

183. Twentieth-Century American Art. Art of the twentieth century in the Americas. Emphasis on the development of regional styles and the emergence of the United States in the vanguard of modernism. One course. *Staff*

184. History of Impressionism. The evolution of the impressionist movement and post-impressionist reactions of the 1880s. Particular attention to the work of Manet, Degas, Monet, Renoir, and Pissarro. C-L: Comparative Area Studies. One course. *Sund*

185. Post-Impressionism. The emergence and development of post-impressionist styles—neo-impressionism, synthetism, symbolism—with emphasis on Seurat, Cézanne, Van Gogh, and Gauguin. The impact of post-impressionism on early twentieth-century movements, including fauvism, expressionism, and cubism. One course. *Sund*

186. Twentieth-Century Art. Modern art from 1900 to present. Emphasis on major movements, theoretical aims, and actual achievements. One course. *Staff*

187. Surrealism. The surrealist movement that flourished in Paris between the World Wars: its origins, aims, and major adherents—such as the artists Miró, Magritte, Tanguy, and Dali—examined in the context of surrealist literature, theory, and politics. One course. *Staff*

188. Twentieth-Century Criticism. Twentieth-century art through the writings of its major proponents from Apollinaire and Roger Fry through Meyer Schapiro and Clement Greenberg to present-day theorists of postmodernism. The definition of modernism and the role of the critic as advocate, mediator, arbiter, and prophet of contemporary trends. One course. *Staff*

189. Modern Architecture. Major movements in European and American architecture in the nineteenth and twentieth centuries with concentration on major architects and major buildings. Technical and theoretical bases; social and aesthetic implications. One course. *Wharton*

190. Art and Politics between the World Wars. Art and politics in Russia, Germany, France, Italy, and the United States between the world wars in such movements as dada, surrealism, neoclassicism, *Neue Sachlichkeit*, Russian constructivism, and the Bauhaus. Topics covered include the function of paintings as political criticism (for example, as fascist or antifascist weapons) or as an expression of social harmony and utopian order, and the union between abstraction and the machine aesthetic. One course. *Whiting*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by consent of Director of Undergraduate Studies. One course each. *Staff*

For Seniors and Graduates

220S. Studies in Greek Art. Specific aspects of the art or architecture in the Greek world from the late Geometric to the Hellenistic periods. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Classical Studies 220S. One course. *Castriota*

221S. Studies in Roman Art. Selected topics in the art and architecture of late republican and imperial Rome. Prerequisite: consent of instructor. C-L: Classical Studies 227S. One course. *Castriota*

222S. Greek Sculpture. C-L: Classical Studies 231S. One course. *Stanley*

223S. Greek Painting. C-L: Classical Studies 232S. One course. *Stanley*

224S. Greek Architecture. See C-L: Classical Studies 233S. One course. *Richardson*

225S. Roman Architecture. C-L: Classical Studies 235S. One course. *Richardson*

226S. Roman Painting. See C-L: Classical Studies 236S. One course. *Richardson*

230S. Medieval and Byzantine Art and Architecture. Conceptual, institutional, or stylistic topics. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Classical Studies 230S and Medieval and Renaissance Studies. One course. *Wharton*

232S. Romanesque and Gothic Art and Architecture. Analysis of an individual topic. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Bruzelius*

240. Italian Art. Examination of an individual artist, a particular movement, or the art of an Italian city. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

242S. Studies in Italian Renaissance Art. Specific problems dealing with iconography, style, or an individual master from c. 1300 to 1600. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Goffen or Spencer*

243S. Studies in Northern Art. Selected topics such as the Antwerp workshops of the sixteenth century, picturing in Haarlem at the turn of the seventeenth century, or Rubens and Rembrandt. Prerequisite: consent of instructor. One course. *Staff*

261S. Studies in Romanticism. Examination of the work of a single artist or the development of a specific theme or movement within the period 1760 to 1850. One course. *Staff*

262S. Studies in Nineteenth-Century Art. Focus on a major artist, movement, or trend in nineteenth-century art. Prerequisite: consent of instructor. One course. *Sund*

276S. Studies in Modern Art. Selected topics in modern art before 1945, with emphasis on major movements of masters. Prerequisite: consent of instructor. One course. *Staff*

277S. Contemporary Art. Historical and critical principles applied to present-day artists and/or movements in all media since World War II. Prerequisite: consent of instructor. One course. *Staff*

282S. Contemporary Theory in the Visual Arts. Theory in contemporary history and its accommodation to theoretical developments in other disciplines (for example, literature, women's studies, Marxism, and anthropology). Focus on the writings of contemporary, theory-centered art historians and critics. Prerequisite: consent of instructor. One course. *Wharton*

291, 292. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by consent of Director of Undergraduate Studies. One course each. *Staff*

293S. Methods of Art History. Approaches to the study of works of art, including connoisseurship, iconology, and stylistic analysis. Prerequisite: consent of instructor. One course. *Staff*

294, 295. Special Problems in Art History. Individual study and research. One course each. *Staff*

DESIGN

To cover materials supplied in design courses, a fee of \$40 will be charged for each course, payable prior to the beginning of classes.

53. Drawing. Directed approaches to practice in life drawing and in the expression of graphic concepts. One course. *Shatzman or Smith*

54. Two-Dimensional Design and Color. Experiments in form and color, with work from observation. Introduction to color theory in various media. Prerequisite: Art 53. One course. *Smith*

56. Three-Dimensional Design. Introduction to the principles and processes of sculpture. Prerequisite: consent of instructor. One course. *Noland*

103, 104. Painting. Studio practice in painting with individual and group criticism and discussion of important historic or contemporary ideas. Prerequisites: Art 54 or equivalent and consent of instructor. One course each. *Pratt*

105, 106. Advanced Drawing and Color. Work from life or in formal modes, with emphasis on personal development, through individual and group criticism and discussion. Prerequisites: Art 53 and 54 and consent of instructor. One course each. *Pratt*

108. Printmaking: Intaglio. Studio course with directed problems in the intaglio medium including etching, aquatint, drypoint, black and white and color printing methods. Prerequisite: Art 53, 54, 107, or consent of instructor. One course. *Shatzman*

109. Printmaking: Silkscreen. Studio course on the silkscreen medium and its stencil-making process including paper, film, glue, tusche, and photographic methods. Prerequisite: Art 53, 54, 107, or consent of instructor. One course. *Shatzman*

110, 111. Sculpture. Studio practice in sculpture. Group and individual discussion and critique. Prerequisite: Art 56 or consent of instructor. One course each. *Noland*

180S. Theory of Design. Visual thinking and innovations in historical and contemporary art. Formal analysis and discussion of important issues for students involved in creating art. Prerequisites: two courses in design and consent of instructor. One course. *Pratt*

203, 204. Advanced Painting. Prerequisites: Art 53 and 54 and consent of instructor. One course each. *Pratt*

207. Advanced Printmaking. Studio course on advanced methods of color printing in the relief, intaglio, silkscreen, and monotype areas. Traditional and more experimental methods and the combinations of the included media. Prerequisite: Art 108, 109, or consent of instructor. One course. *Shatzman*

208. Printmaking: Papermaking. Studio course on handmade sheets for watercolor, printmaking, and drawing. Projects in combination with other studio areas. Prerequisite: Art 53, 103, 108, or consent of instructor. One course. *Shatzman*

217, 218. Individual Project. Independent work open to highly qualified seniors on recommendation of instructor and invitation of department. One course each. *Staff*

See also Institute of the Arts in this bulletin.

COURSES CURRENTLY UNSCHEDULED

101, 102. Photography

107. Survey of Printmaking

143. Classical Tradition in the Renaissance

144. Central Italian Art

149. Death in Art

154. Art of Germany in the Fifteenth and Sixteenth Centuries

209, 210. Advanced Sculpture

279S. Problems in Modern Architecture

THE MAJOR

The student will elect a sequence of courses emphasizing either the history of art or design. The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

History of Art

Major Requirements. Either Art 69 or 70 is recommended, and one of them may be counted toward the requirement of eight courses in the history of art. The eight courses are to include: one course from each of the following areas—ancient, medieval, Renaissance/baroque, and modern; one seminar at the 200 level. For students planning to do graduate work in art history, one of these should be Art 293S. Two years of college level study or the equivalent in French, German, or Italian are strongly recommended. Majors contemplating graduate work in history of art are advised to take more than eight courses in history of art and to gain competence in French and German.

Design

Prerequisites. Art 69 or 70 and one other art history course; Art 53 and 54.

Major Requirements. Five studio courses exclusive of Art 53 and 54.

Institute of the Arts (AI)

Artist-in-Residence Cerveris, *Director*; Fellows Applewhite (English), Arcus (divinity), Bagg (music), Ball (drama), Berg (music), Bloom (music), Clum (drama and English), Coleman (music), Desmond (dance), Dickinson (dance), Dorrance (dance), Fitzmorris

(drama), Goffen (art and art history), Harris (public policy studies), Henry (music), Herman (drama), Hill (music), Hobbs (drama), Jaffe (music), Jeffrey (music), Kremen (psychology), Love (music), Muti (music), Noland (art and art history), Parkins (music), Pope (English), Porter (English), Pratt (art and art history), Price (English), Raimi (music), Shatzman (art and art history), B. Smith (chapel music), H. Smith (art and art history), Szasz (music), Troxler (music), Ward (philosophy), Williams (music), Wray (dance), and Wynkoop (music); Associate Fellows Azenberg (drama), Davis (dance), and Hawkins (music)

The Institute of the Arts offers interdisciplinary courses in the arts, sponsors artist residencies, coordinates and promotes activities in the creative and performing arts, and works to expand the role of the artist in a liberal arts setting. Courses, festivals, and events sponsored by the Institute bring together faculty and students in different art forms to encourage an interdisciplinary perspective. All performing and creative artists who teach at Duke are fellows of the Institute.

The Institute provides advisers for interdepartmental concentrations in the arts and assists students in designing individualized courses of study. A fall-semester off-campus residency program, the Duke in New York Arts Program, provides academic and professional experiences for selected juniors and seniors.

The Dance Program is administered through the Institute, and courses in dance are listed below. Other Institute courses and cross-listed courses are also described below; for courses and majors in art and art history, drama, English, and music see the departmental listings under those headings. For further information about the Institute, inquire in 109 Bivins Building.

DUKE IN NEW YORK ARTS PROGRAM

The Institute-sponsored Duke in New York Arts Program offers an intensive, off-campus experience for a select group of juniors and seniors. The program has four components, each earning one credit: a seminar, an arts internship, a course at New York University, and an independent study project. The Duke courses are described below under Institute Courses. For information on admission to this program, contact the Institute of the Arts.

INSTITUTE OF THE ARTS (AI)

20S. Structure. Does not count toward the divisional or fields of knowledge requirements. See C-L: Zoology 45S. One course. *Wainwright*

101S. Arts Resources in New York. Investigation of a central theme through attendance at selected art events in the New York area supplemented by discussions, critical papers, and reports. Visiting Duke faculty members and New York practitioners in the arts provide guest lectures and lead discussions. Open only to those admitted to the Duke in New York Arts Program. One course. *Staff*

102. Arts Internship in New York. Immersion in the professional art world through apprenticeship to a sponsoring artist, scholar, or organization chosen to match each student's area of interest and expertise. Offered only on the pass/fail basis and open only to those admitted to the Duke in New York Arts Program. One course. *Staff*

110S. Video and Performance. Creation of video works involving the performing arts in the context of contemporary critical theory. Prerequisite: consent of instructor. One course. *Desmond*

115S. Film and Video Theory and Practice. Prerequisite: Comparative Literature 177, Drama 65, or English 81. See C-L: English 83S; also C-L: English 183S, Drama 131S, and Film and Video. One course. *Staff*

121S. The Diaghilev Ballet, 1909-1929. Prerequisite: junior or senior standing or consent of instructor. See C-L: Dance 188S; also C-L: Interdisciplinary Course 188S. One course. *Dickinson and staff*

130. Inter-Arts: Theory and Practice. Principles and techniques in contemporary interdisciplinary performance pieces, using combined art forms. Primary focus on the interrelationships of art forms and on collaboration among artists; analysis of such works as distinguished from more traditional artistic expression. Workshop in creation of a performed work. Half course. *Cerveris and staff*

150. Managing the Arts. Various aspects of planning, organization, promotion, resource development, and general operations of such typical arts organizations as arts councils, museums and galleries, subscription series, orchestras, and dance and theatre companies. Private, public, and governmental support for the arts. One course. *Staff*

151S. Art and Its Making. An inquiry into artistic process from a conceptual survey of dominant views to direct interviewing of and discussion with artists. Prerequisites: junior or senior standing and consent of instructor. One course. *Kremen*

ARTIST IN RESIDENCE PROGRAM

The Nancy Hanks Artist Residency Program brings artists of great breadth and accomplishment to Duke to interact with students, faculty, and the community at large, in settings as diverse as formal courses, class visits, performances and exhibitions, informal workshops and seminars, and off-campus programs.

Courses by Nancy Hanks Resident Artists, and by other visiting artists in the Institute, may not be listed in the bulletin, since they vary from year to year. Consult the current course schedule and the Institute for information about courses by artists in residence.

The Ciompi Quartet, a professional chamber music ensemble, is in residence in the Institute of the Arts all year. Members of the quartet also offer string instruction in the Department of Music. Consult that department's listings for applied music courses.

Courses Currently Unscheduled

120. Romanticism in the Arts

DANCE (DAN)

Associate Professor Wray, *Coordinator of the Dance Program*; Artists-in-Residence Desmond and Dickinson; Part-time Instructors Davis and Dorrance

The Dance Program offers its students the opportunity to study modern dance, ballet, dance history, choreography, repertory, and non-Western dance forms in an environment that challenges the student's intellectual, expressive, and physical capabilities. Emphasis is placed on both the acquisition of technical skills and the creative development of the individual student. Courses in technique, performance and production (half course credit), and theory courses (whole course credit) are offered. Dance theory courses fulfill humanities division and seminar requirements, and students may concentrate in dance through Program II.

Activity Courses

60. Beginning Modern Dance I. A movement course exploring modern dance through technique, improvisation, and composition culminating in a class showing at the end of term. No previous dance experience necessary. Half course. *Staff*

61. Beginning Modern Dance II. Prerequisite: Dance 60 or equivalent. Half course. *Staff*

62. Intermediate Modern Dance I. Increased complexity of movement sequences and greater emphasis on clarity of expression and quality of performance. Prerequisite: Dance 61. Half course. *Staff*

63. Intermediate Modern Dance II. Continuation of Dance 62. Prerequisite: Dance 62 or equivalent. Half course. *Staff*

64. Advanced Modern Dance. Prerequisite: Dance 63 or equivalent. Half course. *Staff*

65. Beginning Improvisation. Exploration of space, time, and energy in movement and of improvisational structures. No previous dance experience necessary. Half course. *Staff*

68. Ballet Fundamentals. Fundamentals of classical ballet technique concentrating on correct placement and body alignment within the ballet vocabulary. No previous dance experience necessary. Half course. *Dorrance*

69. Jazz Dance. The techniques of jazz dance as a contemporary art form. Half course. *Staff*

70. Ballet I. Barre work concentrating on body alignment and correct placement within the ballet vocabulary followed by center adagio and allegro sequences. Prerequisite: Dance 68 or equivalent. Half course. *Dorrance*

71. Ballet II. Greater complexity of barre and center sequences with increased emphasis on correctness of style and quality of performance. Prerequisites: Dance 70 or equivalent, and consent of instructor. Half course. *Dorrance*

79. African Dance Technique. Half course. *Davis*

80. Individual Dance Program. Half course. *Staff*

81. Repertory. The study of choreography and performance through participation in the mounting of a dance work from inception through rehearsal to performance. Prerequisite: consent of instructor. Variable credit. *Staff*

Theory Courses

131. History of Dance. Emphasis on form, structure, and content related to culture of eras. One course. *Dickinson*

131S, 132S. History of Dance. History of modern dance, through the philosophy and work of its major artists considered in relation to the other arts and the socio-political climate of the period 1890 to the present. 131S: from 1890 to 1950; 132S: from 1950 to the present. One course each. *Wray*

133. History of Black Dance. A survey of black dance in Africa, America, and the Caribbean during the eighteenth, nineteenth, and twentieth centuries. One course. *Davis*

135. Introduction to the Principles of Contemporary Dance Composition. Basic compositional tools; sources of movement material; use of movement dynamics, variation, rhythm, and design in dance composition; methods of structuring group compositions from short movement studies to the more complex group pieces. One course. *Staff*

136. Advanced Contemporary Dance Composition. Choreographing for less traditional performing areas; contemporary methods of composition; improvisation as a source of movement material and choreographic form. Prerequisite: Dance 135. One course. *Staff*

181. Special Topics. Content to be determined each semester. Prerequisite: consent of instructor. One course. *Staff*

188S. The Diaghilev Ballet, 1909-1929. The Diaghilev Ballet as a focal point for modernist movements in the arts and a revitalizing force for ballet that brought together choreographers Fokine, Nijinsky, Massine, Nijinska; composers Stravinsky, Ravel, Debussy, Satie; artists Bakst, Benois, Picasso, Braque. Prerequisite: junior or senior standing or consent of the instructor. C-L: Institute of the Arts 121S and Interdisciplinary Course 188S. One course. *Dickinson and staff*

191, 192. Independent Study. One course each. *Staff*

198. Sacred Dance. One course. *Wray*

Courses Currently Unscheduled

134. Creative Movement for Children

139. Movement Connotations

183. Dance and Dance Music, 1600-1800

197. Aesthetics of Twentieth-Century Dance

Asian and African Languages and Literature Courses

Major programs are not offered in Asian and African languages. Interested students are encouraged, however, to consider the major in comparative area studies.

ARABIC (ARB)

1, 2. Elementary Arabic. Understanding, speaking, reading, and writing modern standard Arabic. Language laboratory. One course each. *Cooke*

63, 64. Intermediate Arabic. Reading, composition, and conversation in modern standard Arabic. Readings include selections from the Qur'ān, contemporary literature, and the Arabic press. One course each. *Cooke*

100. North African Culture. Introduction to the culture of North Africa with special emphasis on the modern fiction of the area. (Taught in the summer program in Morocco, in English.) C-L: Comparative Area Studies. One course. *Cooke*

171S. Modern Arabic Literature in Translation. C-L: Comparative Area Studies. One course. *Cooke*

173S. Women in Arabic Literature. Taught in English. Representative novels, short stories, plays, and poems by writers (mostly female) in the Arab world. C-L: Comparative Area Studies and Women's Studies. One course. *Cooke*

191, 192. Independent Study. One course each. *Cooke*

CHINESE (CHN)

1, 2. Elementary Chinese. Introduction to speaking, understanding, reading, and writing modern standard Chinese (Mandarin, or *putonghua*, based on the Beijing dialect). One and one-half courses each. *Wang and staff*

1A. Abridged Elementary Chinese. Fundamentals of spoken and written modern standard Chinese (Mandarin). Intended for post-baccalaureate and summer session students. Prerequisite: consent of instructor. One course. *Staff*

2A. Abridged Elementary Chinese II. Prerequisites: Chinese 1A and consent of instructor. One course. *Staff*

63, 64. Intermediate Chinese. Reading, oral practice, language laboratory. One and one-half courses each. *Kunst and staff*

125, 126. Advanced Chinese. Contemporary nonfiction, films, and the media, concerning current political, social, and economic issues in China, Taiwan, and Hong Kong. Prerequisite: Chinese 63, 64 or equivalent. One course each. *Staff*

135, 136. Introduction to Modern Chinese Literature. Prerequisite: Chinese 64 or equivalent. C-L: Comparative Area Studies. One course each. *Kunst*

141S. The Fantastic in Chinese Fiction. A survey of Chinese narrative convention with special emphasis on the genre of the fantastic in premodern fiction. Topics include the influence of Chinese literary conventions and religious modes on the fantastic in tales and full-length novels. C-L: Comparative Area Studies. One course. *Wang*

142. Classical Chinese Nature Poetry in Translation. Introduction to Chinese landscape poetry from 1100 B.C. to the Tang Dynasty. Comparison with English romanticism, relations between poetry and religion, and influence upon modern Anglo-American poetries. C-L: Comparative Area Studies. One course. *Wang*

166S. The *I Ching*, or Book of Changes. Its place in ancient Chinese religion and systematic thought; its contributions to Chinese and world culture. Taught in English. C-L: Comparative Area Studies. One course. *Kunst*

171. The Novel in Modern China. Reading and discussion in depth of a selected novel, with its cultural and historical background. Prerequisite: Chinese 125 or 126 or equivalent. C-L: Comparative Area Studies. One course. *Kunst*

182S. Classical Readings in Chinese Philosophy. An examination of early Chinese philosophies: Confucianism and Taoism in the classical texts. The sacred and the secular, political philosophies of Confucianism and Taoism, and the historical rise of the two schools. Taught in Mandarin Chinese. Prerequisite: Chinese 63, 64, 125 or 126. C-L: Comparative Area Studies. One course. *Wang*

191, 192. Independent Study. One course each. *Staff*

Courses Offered in the Duke Study in China Program at Beijing Teachers College and Nanjing University

111, 112. Intensive Progress in Chinese. One course each. *Staff*

127. Chinese Conversation and Composition. Discussion based on oral and written reports. Aural comprehension practice. One course. *Staff*

129. Advanced Readings in Chinese. Reading and discussion of selections from modern Chinese literature, expository prose, and the Chinese press. One course. *Staff*

193. Directed Study. Reading and research culminating in a paper, on a topic approved and supervised by the resident director. One course. *Staff*

HEBREW (HEB)

1, 2. Elementary Modern Hebrew. Introduction to speaking, understanding, reading, and writing modern Hebrew. Language laboratory. One course each. *Staff*

63, 64. Intermediate Modern Hebrew. Reading, composition, conversation, and language laboratory. Prerequisite: Hebrew 1, 2 or equivalent. One course each. *Staff*

191, 192, 193, 194. Independent Study. One course each. *Staff*

HINDI-URDU (HIN)

1, 2. Intensive Elementary Hindi-Urdu. Conversation, basic grammar, and vocabulary; introduction to the Devanagari script and the reading of graded texts. Four hours of classroom work; two hours of language laboratory drill. One course each. *Apte*

63, 64. Intensive Intermediate Hindi-Urdu. Reading, composition, and conversation. Four hours of classroom work, two hours of language drill. Prerequisites: Hindi-Urdu 1 and 2. One course each. *Staff*

191, 192. Independent Study. Directed reading and research. Open only to students with prior knowledge of Hindi-Urdu. One course each. *Apte*

JAPANESE (JPN)

1, 2. Elementary Japanese. Introduction to speaking, understanding, reading, and writing. One course each. *Nagai and staff*

63, 64. Intermediate Japanese. Practice on advanced spoken and written patterns; reading and discussion. One course each. *Kuriya and staff*

155, 156. Readings in Modern Japanese. C-L: Comparative Area Studies. One course each. *Fowler and staff*

161. Modern Japanese Fiction in Translation. An examination of the major forms of long and short fiction from 1890 to the present and the tradition from which they arose. C-L: Comparative Area Studies. One course. *Fowler*

175. Structure of Japanese. Syntactic and semantic analysis of Japanese within the framework of current linguistic theory. Prerequisites: Japanese 1 and 2. C-L: Comparative Area Studies. One course. *Nagai*

183, 184. Topics in Japanese. Readings and other material, including television and radio broadcasts. Exercises in composition. Prerequisite: consent of instructor. C-L: Comparative Area Studies. One course each. *Fowler or Nagai*

191, 192. Independent Study. One course each. *Staff*

KOREAN (KOR)

1, 2. Elementary Korean. Learning through self-instructional mode. Intensive work in language laboratory; drill sessions with native speaker; emphasis on conversation. Reading and writing in *hangul* script. One course each. *Staff*

63, 64. Intermediate Korean. Spoken and written Korean through self-instructional mode. One course each. *Staff*

PERSIAN (PER)

1, 2. Elementary Persian. Introduction to spoken and literary Persian: understanding, speaking, reading, and writing. Language laboratory drill. One course each. *Lawrence*

63, 64. Intermediate Persian. Four hours of classroom work. Advanced reading and composition in classical Persian. Prerequisite: elementary Persian. One course each. *Lawrence*

101. Introduction to Persian Literature. An introduction to classical Persian literature through the reading and translation of selected prose and poetry classics. Prerequisites: Persian 64 or the equivalent, and consent of instructor. One course. *Lawrence*

SWAHILI (SWA)

1, 2. Elementary Swahili. Language instruction through self-instructional mode. Intensive work in language laboratory; drill sessions with native speakers. Emphasis on conversation. One course each. *W. O'Barr*

14. Intensive Swahili. Accelerated introduction to Swahili, combining in one semester the work of Swahili 1 and 2. Normally offered only in the summer. Two courses. *W. O'Barr*

63, 64. Intermediate Swahili. Classroom work and language laboratory drill. An advanced study of language, culture, and literature. One course each. *W. O'Barr*

191, 192. Independent Study. One course each. *W. O'Barr*

Astronomy

For courses in astronomy, see Physics.

Biology (BIO)

A major is available in biology.

The introductory biology courses and the biology major are cooperatively administered by the Department of Botany and the Department of Zoology. Additional courses in biosciences are offered by the Departments of Botany and Zoology, and also by the Departments of Anthropology, Chemistry, and Psychology in Trinity College of Arts and Sciences; by the Departments of Anatomy, Biochemistry, Microbiology and Immunology, Pathology, and Physiology in the School of Medicine; and by the Schools of Engineering and Forestry and Environmental Studies.

10L. Marine Biology. Physical and chemical characteristics of marine ecosystems and the functional adaptations of marine organisms to these systems. Lectures, field trips, and laboratories. For students not majoring in a natural science. Given at Beaufort. C-L: Marine Sciences. One course. *Staff*

14L. Principles of Biology. A one-semester introduction. Lectures and laboratories. One course. *Staff*

Biology 14L is a prerequisite to most courses in botany and zoology. Both Biology 10L and Biology 14L may count for the distributional requirements and for the requirement in empirical science.

THE MAJOR

The Bachelor of Arts and the Bachelor of Science degrees are offered with a major in biology, in botany, in zoology, or in an individually designed interdepartmental concentration approved by the appropriate Director of Undergraduate Studies. The Director of Undergraduate Studies for the biology major is alternately the Director of Undergraduate Studies in botany or zoology.

Information about the biology major may be obtained in the office of the Director of Undergraduate Studies for the biology major. For descriptions of courses appropriate for the biology major see courses listed in this bulletin under the Departments of Botany and Zoology and related departments.

For the A.B. Degree

The A.B. degree program is a general liberal arts major program for students not intending further professional study in the natural sciences or the medical sciences. Preprofessional students should elect the degree program leading to the B.S. degree.

Prerequisite. Biology 14L or equivalent.

Corequisites. Botany 145L; Zoology 74L or 76L; Chemistry 11 and 12, or 23, or 31S; and Mathematics 31 or 33 or 41.

Major Requirements. A minimum of six courses in the biosciences, not including the above prerequisite and corequisites. The six courses must include one course each from three of the following five areas in the Departments of Botany and Zoology: cell biology, genetics, plant or animal physiology, plant or animal ecology, and evolution or systematics. The remaining three courses may be elected from among courses numbered 100 or above in botany, zoology, or in the basic science departments in the School of Medicine, or from approved courses of a basic biological character in related departments.

For the B.S. Degree

This is the preprofessional program in biology.

Prerequisite. Biology 14L or equivalent.

Corequisites. Botany 145L; Zoology 74L or 76L; Chemistry 11 and 12, or 23, or 31S, and 151; Mathematics 31 or 33 plus 32 or 34, or Mathematics 41; Physics 51, 52; Biochemistry 227 or Chemistry 175.

Major Requirements. A minimum of six courses in the biosciences, not including the prerequisite and corequisites immediately above. As specified for the A.B. degree, these six must include three from the designated five areas, with the other three as for the A.B. degree except that at least one must be numbered 200 or above. At least one semester of independent study is recommended.

For Departmental Majors and Interdepartmental Concentrations

See major requirements under Botany and Zoology for botany majors and zoology majors, respectively. For an individually designed interdepartmental concentration (for example, in cell and molecular biology, physical biology, marine biology) see the Directors of Undergraduate Studies who can help arrange for such programs. See major requirements under Chemistry for a specialization in biological chemistry.

Honors

The botany and zoology departments offer a program for graduation with distinction in biology. See the section on honors in this bulletin. Students interested in pursuing an honors program should consult the Director of Undergraduate Studies for the biology major.

Botany (BOT)

Professor W. Culberson, *Chairman*; Professor Wilbur, *Director of Undergraduate Studies*; Professors Antonovics, Boynton, Christensen, Osmond, Ramus, Schlesinger, Searles, Siedow, Stone, Strain, and White; Associate Professor Knoerr; Assistant Professors Johnston, Kohorn, Mishler, and Vilgalys; Professors Emeriti Anderson, Billings, Hellmers, Kramer, Naylor, and Philpott; Adjunct Professor C. Culberson; Adjunct Associate Professor Patterson

A major is available in this department.

The introductory course is Principles of Biology. It is listed under Biology in this bulletin.

43. Ecology and Society. Ecological concepts and their application to human society. Intended for nonscience majors. One course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

53. Introductory Oceanography. Basic principles of physical, chemical, biological, and geological oceanography. C-L: Geology 53. One course. *Pilkey and Searles*

85. Ecology and Natural History of North America. Origin, distribution, structure, and function of ecosystems related to past and present patterns of geology, climate, and human land use. One course. *Christensen*

90. Plants and Man. The biological nature of crop plants, the world's major economic plants, and the origins and evolution of agriculture. One course. *Staff*

102. Trees and Shrubs of North Carolina. Identification and natural history of the trees, shrubs, and woody vines. Emphasis on those cultivated or occurring naturally in North Carolina. One course. *Wilbur*

- 103L. General Microbiology.** Classical and modern principles of the structure, physiology, and genetics of microorganisms and their roles in human affairs. Prerequisite: one course in a biological science or consent of instructor. One course. *Vilgalys*
- 105. Molecular Biology.** Molecular aspects of gene expression and cell differentiation; application of recombinant-DNA techniques to basic and applied problems. Prerequisite: Biology 14. One course. *Johnston*
- 114L. Biological Oceanography.** Laboratory emphasis. Given at Beaufort. Prerequisite: introductory biology. See C-L: Zoology 114L; also C-L: Marine Sciences. Variable credit. *Ramus and staff*
- 116L. Biology of Marine Macrophytes.** Physiology and ecology of seaweeds, seagrasses, marshgrasses, and mangroves. Biological flux of carbon and nutrients in coastal seas. Ecological consequences of photosynthetic adaptations. Given at Beaufort. Prerequisites: introductory biology and Chemistry 11, 12 or equivalent. C-L: Marine Sciences. One course. *Ramus*
- 120. Principles of Evolution.** Evidence for evolution; mechanisms of micro- and macro-evolutionary change. Genetic change in populations. Ecological, behavioral, molecular forces influencing genetic change. Speciation; phylogenetic reconstruction. Prerequisite: introductory biology. C-L: Zoology 120. One course. *Antonovics*
- 142L. Plant Systematics.** Surveys major groups. Principles of vascular plant taxonomy with practice in identification of local flora. Lectures, laboratories, and field trips. One course. *Mishler and Wilbur*
- 145L. Plant Diversity.** Major groups of living plants, their evolutionary origins and phylogenetic relationships. Prerequisite: introductory biology. One course. *Mishler, Searles, or Wilbur*
- 146L. Ecology of Plants.** Principles of the relationships between plants and their environments. Structures and processes of ecosystems. Laboratory, lectures, and field trips. Prerequisites: introductory biology and one other course in biology. One course. *Christensen, Schlesinger, or Strain*
- 151L. Plant Physiology.** Principal physiological processes of plants, including respiration, photosynthesis, water relations, and factors associated with plant morphogenesis. Prerequisites: introductory biology and one year of chemistry; organic chemistry is desirable. One course. *Siedow*
- 160L. Plant Anatomy.** A comparative study of basic cell types, tissues, and organs of vascular plants. Correlation of anatomical information with pertinent literature, application of anatomy to problems in systematics and evolution, and the interrelationship between structure and function. Prerequisite: plant diversity or consent of instructor. One course. *White*
- 162. Principles of Cell Biology.** Structure and function of organelles, metabolism, and regulatory mechanisms. Prerequisites: introductory biology and Chemistry 12. C-L: Zoology 160. One course. *Kohorn, McClay, or M. Nijhout*
- 162L. Principles of Cell Biology.** See Botany 162. Includes laboratory. C-L: Zoology 160L. One course. *Kohorn, McClay, or M. Nijhout*
- 180. Principles of Genetics.** Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisite: introductory biology. C-L: The University Program in Genetics and Zoology 180. One course. *Antonovics, Boynton, and Gillham*

191, 192. Independent Study. Directed reading and research. Open to qualified students in the junior and senior years by consent of department. C-L: Marine Sciences. Variable credit. *Staff*

193T, 194T. Tutorial in Botany. Variable credit. *Staff*

195S, 196S. Seminar in Botany. Variable credit. *Staff*

199S. The Changing Biosphere: Past, Present, and Future. Prerequisite: consent of instructor. See C-L: Distinguished Professor Course 199S. One course. *Billings*

For Seniors and Graduates

210L. Bryology. Morphological, systematic, and ecological characteristics of mosses and liverworts. One course. *Mishler*

212L. Phycology. Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. One course. *Searles*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis will be placed on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Given at Beaufort. Prerequisite: a course in general ecology. C-L: Forestry and Environmental Studies 218 and Marine Sciences. One and one-half courses. *Staff*

219L. Benthic Marine Algae. Morphology, reproduction, life histories, systematics, and natural history of seaweeds. Lectures, laboratories, and field work in ocean and estuaries. Given at Beaufort. Prerequisite: introductory biology; plant diversity recommended. C-L: Marine Sciences. One course. *Searles*

221L. Mycology. Survey of the major groups of fungi with emphasis on life history and systematics. Field and laboratory exercises. One course. *Vilgalys*

222S. Topics in Advanced Mycology. Current research on fungal evolution, genetics, physiology, and ecology. Prerequisite: Botany 221L or consent of instructor. One course. *Vilgalys*

225T, 226T. Special Problems. Students with adequate training may do special work in the fields listed below. Variable credit.

1. Genetics. *Antonovics*
2. Genetics. *Boynton*
3. Ecology. *Christensen*
4. Lichenology. *W. Culberson*
5. Molecular Botany. *Johnston*
6. Cell Biology. *Kohorn*
7. Bryology and Systematics. *Mishler*
8. Physiological Ecology. *Osmond*
9. Phycology. *Ramus*
10. Ecology. *Schlesinger*
11. Phycology. *Searles*
12. Physiology. *Siedow*
13. Systematics of Flowering Plants. *Stone*
14. Ecology. *Strain*
15. Mycology and Molecular Systematics. *Vilgalys*
16. Anatomy and Morphology of Vascular Plants. *White*
17. Systematics of Vascular Plants. *Wilbur*

227. Introductory Biochemistry I: Intermediary Metabolism. Chemistry of the constituents of proteins, lipids, carbohydrates, and nucleic acids and their metabolic interrelationships. Prerequisite: organic chemistry. C-L: Biochemistry 227. One course. *Fridovich and Rajagopalan*

232. Microclimatology. C-L: Forestry and Environmental Studies 232. One course. *Knoerr*

234S. Problems in the Philosophy of Biology. Prerequisite: consent of instructor. See C-L: Philosophy 234S; also C-L: Zoology 234S. One course. *Brandon (philosophy)*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: introductory biology and one course in animal or plant diversity. C-L: Zoology 237L. One course. *Lundberg and Mishler*

243S. Classification of Angiosperms. The characteristics and phylogenetic relationships of large and important families of angiosperms with emphasis upon the systems of Cronquist and Thorne. Prerequisite: Botany 142L or equivalent. One course. *Wilbur*

250L, S. Plant Biosystematics. Descriptive and experimental procedures used to assess systematic implications of plant evolution. Laboratory, discussion, and field-oriented problems. Prerequisites: basic courses in systematics and genetics. One course. *Vilgalys*

253. Biophysical Plant Physiology. Application of physical principles to such processes as ion transport, water relations, and the interconversion of energy in plant cells. Prerequisites: Botany 151L and Mathematics 32 or equivalent. One course. *Knoerr or Siedow*

261. Photosynthesis. Principles of photosynthesis: developmental, mechanistic, regulatory, and ecological aspects of the photosynthetic process. Prerequisite: Botany 151L or 251L. One course. *Siedow*

263L. Tropical Seaweeds. Collection, preservation, description, identification, illustration, and descriptive ecology. Two-week field study on Andros Island in the Bahamas. Prerequisite: Botany 145L or equivalent; or consent of instructor. Half course. *Searles*

265L. Physiological Plant Ecology. The physiological approach to interpreting adaptation in plants, with emphasis on terrestrial seed plants. Prerequisites: Botany 146L and 151L or equivalents. One course. *Strain*

266. Plant Population Biology. Theoretical, experimental, and field approaches to plant population dynamics; population growth and regulation; effects of density, competition, and predation. One course. *Antonovics*

267L. Community Ecology. Mechanisms that determine the distribution and abundance of plants and animals: geology, climate, physiography, soils, competition, predation, and history. Lectures focus on ecological principles. Seminars and weekend field trips. Prerequisites: an introductory ecology course and consent of instructor. C-L: Zoology 204L. One course. *Christensen and H. Wilbur (zoology)*

268. Molecular Biology II: Nucleic Acids. Structure and metabolism of nucleic acids in the context of their biological function in information transfer. Prerequisites: introductory biochemistry and Biochemistry 259 or consent of instructor. C-L: Biochemistry 268 and Microbiology and Immunology 268. One course. *Modrich and staff*

269. Advanced Cell Biology. Prerequisite: introductory cell biology or consent of instructor. See C-L: Zoology 269; also C-L: Anatomy 269, Microbiology and Immunology 269, and The University Program in Cell and Molecular Biology. One course. *McClay and staff*

272. Biogeochemistry. Processes controlling the circulation of carbon and biochemical elements in natural ecosystems and at the global level, with emphasis on soil and surficial processes. Prerequisite: Chemistry 12, Botany 146L, or equivalent. C-L: Geology 272. One course. *Schlesinger*

283. Extrachromosomal Inheritance. Genetics, biochemistry, and molecular biology of the organelles of eukaryotic cells, and cellular symbionts. Prerequisite: introductory genetics. C-L: The University Program in Genetics and Zoology 283. One course. *Boynton and Gillham*

285S. Ecological Genetics. Interaction of genetics and ecology and its importance in explaining the evolution, diversity, and distribution of plants and animals. Prerequisites: Botany 180 and 286 or equivalents. C-L: The University Program in Genetics. One course. *Antonovics*

286. Evolutionary Mechanisms. Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Prerequisites: either Botany 145L/245L or Zoology 74L, and a course in genetics. C-L: The University Program in Genetics and Zoology 286. One course. *Antonovics, Uyenoyma, and H. Wilbur (zoology)*

287S. Macroevolution. Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Zoology 287S. One course. *Mishler and Roth*

293L. Population Biology. Theoretical approach to population genetics, life table mathematics, life-cycle evolution in plants and animals, population dynamics, and regulation. Laboratories emphasize experimental methods. Individual projects and weekend field trips. Prerequisites: calculus and ecology and consent of instructor. C-L: Zoology 293L. One course. *Antonovics and H. Wilbur*

295S, 296S. Seminar. Variable credit. *Staff*

COURSES CURRENTLY UNSCHEDULED

51L. Culture and Propagation of Plants

75. Plants of the Southeast

209L. Lichenology

258. Physiology of Growth and Development

MARINE LABORATORY

Botany 114L, 191, 192, 215L, 218, and 219L are offered during the summer at the Duke University Marine Laboratory, Beaufort, North Carolina. The Department of Botany also participates in the semester programs at the Marine Laboratory. See Marine Sciences in this bulletin and consult the *Bulletin of Duke University: Marine Laboratory* for further information.

THE UNIVERSITY PROGRAM IN GENETICS

Courses offered by the Department of Botany are an integral part of this interdepartmental program. Refer to the announcement in this bulletin under The University Program in Genetics for a listing of other offerings.

THE MAJOR

For the A.B. Degree

This degree program is the general liberal arts major program. Preprofessional students should elect the bachelor of science degree program.

Prerequisite. Introductory college biology or advanced placement in botany.

Corequisites. Two courses in introductory chemistry (Chemistry 11, 12) or advanced placement in chemistry; one course in college mathematics or equivalent.

Major Requirements. A minimum of eight approved botany or closely related science courses, in addition to the prerequisite and corequisites, including 145L (plant diversity) and at least three courses selected from the following five areas: cell biology, genetics, plant ecology, evolution/systematics, and physiology. The Director of Undergraduate Studies must approve the selection of any science courses in related departments to be included in the eight courses for the major. Students' programs are tailored to their interests and plans for the future.

For the B.S. Degree

This degree program is recommended for all preprofessional students.

Prerequisite. Introductory college biology or advanced placement in botany.

Corequisites. Chemistry through one semester of organic and one semester of biochemistry, two courses in college mathematics or equivalent, and one year of college physics.

Major Requirements. Eight science courses as described under major requirements for the A.B. degree. A course in statistics is recommended. The emphasis in this preprofessional program will depend on the student's interests; each program is arranged on an individual basis.

For the Interdepartmental Concentration and Biology Major

An interdepartmental program (e.g., in cell and molecular biology, physical biology, and marine biology) may be pursued instead of a departmental major. The appropriate Director of Undergraduate Studies in botany or zoology can help arrange for such programs. See requirements under Biology for a biology major.

Honors

The department offers a program for graduation with distinction in botany. See the section on honors in this bulletin. The program is usually initiated during the junior year and involves participation in at least two semesters of independent study (Botany 191, 192). The research paper which results from this experience is submitted to a departmental committee for review, followed by a discussion of the paper with the student. On the basis of the quality of the research report and the student's performance in the discussion of it, the committee may recommend the student for graduation with distinction in botany.

Canadian Studies Program

Professor Cahow, *Director*

A second major is available in this program.

The program in Canadian studies seeks to provide the student with an understanding of Canada and its problems and prospects. Students may undertake the program to supplement another major, or to complete a second major in Canadian studies, or as part of an interdepartmental concentration, or under Program II. Canadian studies may also be an area concentration in the comparative area studies major, described elsewhere in this bulletin. See sections below on the program and the major. The courses are described in the departmental and interdisciplinary listings.

COURSES WITH FULL CANADIAN CONTENT

The following courses count as one full course in the four required for the program in Canadian studies and in the eight required for the major in Canadian studies:

English

186. Canadian Literature in English. *Armitage*

History

183S. Canada from the French Settlement. *Cahow*

Interdisciplinary Courses

184. An Introduction to Canada and Canadian Issues. See C-L: Interdisciplinary Course 184; also C-L: Comparative Area Studies, Economics 184, History 184, Political Science 184, and Sociology 184. *Cahow*
 282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Comparative Area Studies, History 282S, Political Science 282S, and Sociology 282S. *Cahow*

COURSES WITH SIGNIFICANT CANADIAN CONTENT

Two of these partial content courses may count as one full course among the four required for the program in Canadian studies and among the eight required for the major in Canadian studies, but no more than two partial content courses may be counted as full content courses in this way. All other partial content courses may count only for a half credit for Canadian studies majors and programs.

Economics

265S. International Trade and Finance. By special arrangement this course may be counted as a full content course. *Tower*

French

114. Language and Civilization of Quebec. *Staff*
 131S. French in the New World. *Hull*

Health Administration

Students interested in this area should consult the Director of the Canadian Studies Program (2016 Campus Drive) for more information.

History

150. Canadian and American Agrarian Movements. *Goodwyn*
 166S. U.S. and Canada: Canadian-American Relations. *C. Davis*
 167S. United States and Canadian Constitutional Issues. *Cahow*
 215-216. The Diplomatic History of the United States. *C. Davis*

Interdisciplinary Courses

182. Media in Comparative Perspective. *Paletz or Smith*

Political Science

175. Political Parties and Legislatures in Western Democracies. *Kornberg*
 180. Media in Comparative Perspective. *Paletz or Smith*
 195. Comparative Political Behavior in the United States and Canada. *Kornberg*
 293. Federalism. *Leach*

Sociology

170. Mass Communication. *Smith*
 179. Modern Nationalist Movements. *Tiryakian*
 182. Media in Comparative Perspective. *Paletz or Smith*

THE PROGRAM

In the Canadian Studies Program a student must take four courses with Canadian content or their equivalents. These must include Interdisciplinary Course 184. It is recommended that students who do not have the equivalent of two years of college level French should take French 181 and 182, Intensive French.

THE MAJOR

Corequisite. Completion of another major.

Major Requirements. Eight courses in Canadian studies, including Interdisciplinary Course 184 and seven other semester-course credits in courses on Canada with full or significant content, or approved independent study, or special reading courses. Two of the courses with significant Canadian content may count as half courses to make up the eight required courses. No more than two courses required for the first major may be counted for the Canadian studies major.

To complete the major in Canadian studies a student must also take at least two full years of college level French, or must possess an equivalent competence in the language as certified by the Department of Romance Languages.

Chemistry (CHM)

Professor Arnett, *Chairman*; Professor Wilder, *Director of Undergraduate Studies*; Professor Bonk, *Supervisor of Freshman Instruction*; Professors Baldwin, Chesnut, Crumbliss, Fraser-Reid, Jeffs, Krigbaum, Lochmüller, A. McPhail, Palmer, Poirier, Porter, Smith, Strobel, and Wells; Associate Professors Henkens, McGown, and Shaw; Assistant Professors R. MacPhail and Polniaszek; Professors Emeriti Bradsher, Brown, Hobbs, and Quin; Adjunct Professors Ghirardelli, Painter, Pitt, Preston, and Spielvogel; Adjunct Associate Professors Morosoff and Millington; Adjunct Assistant Professors Chao and Sternbach

A major is available in this department.

Courses with laboratories include fifty to sixty hours of laboratory work per term.

11, 12. Principles of Chemistry. The introductory course for students who intend to take additional chemistry courses other than Chemistry 103. 11: emphasizes stoichiometry and atomic and molecular structures. 12: emphasizes thermodynamics, chemical kinetics, synthesis, and analysis. Laboratory work includes both qualitative and quantitative analysis. Prerequisites: one year of high school chemistry or consent of instructor; qualification for Mathematics 31; and for 12: Chemistry 11. One course each. *Bonk and staff*

23. Advanced General Chemistry. An intensive introductory course for well prepared students, covering in one semester the major topics of Chemistry 11 and 12. Laboratory work includes both qualitative and quantitative analysis. Students may not receive credit for both Chemistry 23 and Chemistry 11, 12 or Chemistry 31S. Prerequisites: Mathematics 19 or its equivalent; and two years of high school chemistry or consent of instructor. One course. *Bonk and staff*

31S. Advanced Chemical Fundamentals. Generally paralleling Chemistry 23, but for selected able potential science majors. Taught as one lecture and two discussions weekly. Laboratory with a month of small research problems. Prerequisite: consent of instructor. One course. *R. MacPhail or Strobel*

103. Chemistry and Society. Past discoveries and current challenges: a chemical background for decisions involving energy, radiation, pollution, drugs, food additives, vitamins, and pesticides. For students not majoring in a natural science or continuing in chemistry. Not open to students having credit for Chemistry 11 or equivalent. One course. *Wells and staff*

117. Inorganic Chemistry. Bonding, structures, and reactions of inorganic compounds studied through physical chemical concepts. Prerequisite: Chemistry 161. One course. *Crumbliss, Palmer, or Wells*

132. Analytical Chemistry. Fundamentals of qualitative and quantitative measurement with emphasis on instrumental methods of analysis. Laboratory. Prerequisite: Chemistry 161. One course. *Lochmüller, McGown, or Strobel*

151, 152. Organic Chemistry. The structures and reactions of the compounds of carbon. Laboratory: techniques of separation, organic reactions and preparations, and systematic identification of compounds by their spectral and chemical properties. Prerequisite: Chemistry 12, 23, or 31S or consent of Director of Undergraduate Studies; for 152: Chemistry 151. One course each. *Baldwin, Fraser-Reid, Polniaszek, Porter, or Wilder*

151M, 152M. Organic Chemistry. The structures and reactions of the compounds of carbon. The courses, principally for majors, are similar to 151 and 152, but are taught

in a more interactive format made possible by a marked reduction in class size. The M suffix will not appear on the transcript. Laboratory. Prerequisites: Chemistry 12, 23, or 31S and consent of instructor; for 152M: Chemistry 151 or 151M. One course each. *Baldwin, Fraser-Reid, Polniaszek, Porter, or Wilder*

152P. Preceptorial. Elective for students in Chemistry 152 or 152M. Laboratory. Prerequisite: consent of instructor. No credit. *Staff*

154. Intermediate Organic Chemistry: Mechanism and Stereochemistry of Synthetic Organic Reactions. A mechanism-based survey of enolate chemistry, sigmatropic rearrangements, polyene cyclizations, hydroboration, oxidation and reduction methods. Laboratory work emphasizes techniques involved in manipulation of sensitive reagents and analysis of reaction products. Prerequisite: Chemistry 152 or 152M. One course. *Polniaszek*

161. Physical Chemistry. Fundamentals of theoretical chemistry with particular emphasis on chemical thermodynamics and kinetics. Laboratory. Prerequisites: Chemistry 152 or 152M and Physics 52 and Mathematics 32 or 34. One course. *Chesnut, Henkens, R. MacPhail, and Smith*

162. Physical Chemistry. Fundamentals of theoretical chemistry with particular emphasis on quantum chemistry, molecular structure, and molecular spectroscopy. Laboratory. Prerequisites: Chemistry 161 and either Mathematics 103 or 105 or consent of instructor. One course. *Chesnut, R. MacPhail, and Smith*

175. Molecular Basis of Biological Processes. A survey of the structures, reactions, and mechanisms of action of important biological molecules. Prerequisite: Chemistry 152 or 152M. One course. *Shaw*

176. Biophysical Chemistry. The physical chemical principles of and experimental methods employed in the study of biological macromolecules. Students may not receive credit for both Chemistry 176 and 196S. Prerequisites: Chemistry 161 and 175 or equivalent. One course. *Henkens*

191, 192. Independent Study. Supervised reading and research. Prerequisite: consent of Independent Study Coordinator. One course each. *Staff*

193, 194. Independent Study. Supervised reading and research. Prerequisites: Chemistry 191, 192, and consent of Independent Study Coordinator. One course each. *Staff*

195S, 198S. Seminar. Topics from various areas of chemistry, changing each year. For example: organic chemistry of biologically important compounds, chemical basis of pharmacology, metal ions in biological systems. Open to senior chemistry majors or by consent of instructor. One course each. *Staff*

196S. Seminar. Selected topics in physical chemistry of biological macromolecules. Students may not receive credit for both Chemistry 176 and 196S. Prerequisites: Chemistry 161 and 175. One course. *Henkens or Shaw*

197S. Seminar. Special topics in biological chemistry (e.g., immunochemistry, molecular biology). Prerequisite: Chemistry 161; Chemistry 175 recommended. One course. *Staff*

For Seniors and Graduates

201. Molecular Spectroscopy. Selected spectroscopic methods in the study of molecular structure. Symmetry and group theoretical basis for selection rules, theories of magnetic and optical resonance, and interpretation of spectra; examples from both inorganic and organic chemistry. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

203. Quantum Chemistry. Basic principles of quantum and group theoretical methods. Topics include symmetry and a review of the fundamentals and the mathematical foundations of quantum theory. Emphasis on the application of molecular orbital theory to organic and inorganic systems. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

205. Structure and Reaction Dynamics. Structure and mechanisms in organic and inorganic compounds, substitution reactions, linear free energy relations, and molecular rearrangements. Emphasis on the use of kinetic techniques to solve problems in reaction mechanisms. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

207. Principles of Kinetics, Thermodynamics, and Diffraction. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

209. Advanced Chemistry. A combination of three one-third course segments from Chemistry 201, 203, 205, and 207. Interested students should consult the Director of Undergraduate Studies for scheduling. Prerequisite: consent of Director of Undergraduate Studies. One course. *Staff*

275, 276. Advanced Studies. (1) Analytical chemistry, (2) inorganic chemistry, (3) organic chemistry, and (4) physical chemistry. Open to especially well-prepared undergraduates by consent of Director of Undergraduate Studies. One course each. *Staff*

THE MAJOR

Differing major programs are offered under the baccalaureate degrees. The Bachelor of Arts degree programs permit greater flexibility in allowing students to select an area of concentration while satisfying the junior-senior small group learning experience requirements through seminar courses (option one) or through independent study in chemistry or related departments (option two). Of particular significance are the areas of specialization including marine chemistry, chemical physics, materials science, and biological chemistry. Students may specialize in biological chemistry using either seminars (option three) or independent study in chemistry or related departments (option four) to satisfy the junior-senior small group learning experience requirement. The Bachelor of Science degree program, accredited by the American Chemical Society, provides in-depth preparation for graduate study in chemistry.

For the A.B. Degree

Prerequisites. Chemistry 11, 12; or Chemistry 23 or 31S; or advanced placement. Mathematics 31, 32 (or 33, 34); Physics 51, 52.

Major Requirements. Chemistry 132, 151, 152, 161, *plus* one of the following options:

1. Two of the following: Chemistry 117, 154, 162, 175, 176, 195S, 196S, 197S, 198S.
2. One of the following: Chemistry 117, 154, 162, 175; *plus* Chemistry 191, 192 or the equivalent in a natural science, mathematics, engineering, or a basic science department in the School of Medicine.
3. Chemistry 175; 195S, 197S or 198S; and 176 or 196S.
4. Chemistry 175 and 176; and Chemistry 191, 192 in a biochemically related area, or the equivalent in a biological area, biomedical engineering, or basic science department in the School of Medicine.

Recommendations. Computer Science 51 or Engineering 51, Mathematics 103 or 105 (for options one and two); Chemistry 162; two courses in a foreign language or the equivalent. Students planning graduate study are advised to take these recommended courses and to consult with advisers regarding appropriate additional courses.

For the B.S. Degree

Prerequisites. Chemistry 11, 12; or Chemistry 23 or 31S; or advanced placement. Mathematics 31, 32 (or 33, 34); 103 (or 105); Physics 51, 52; two courses in German or Russian or the equivalent.

Major Requirements. Chemistry 117, 132, 151, 152, 161, 162, plus four of the following courses: Chemistry 154, 175, 176, 191, 192, 195S, 196S, 198S, 201, 203, 205, 207, 209, 275, or 276, with at least two being selected from the laboratory courses 154, 191, 192. In an exceptional case and with the prior approval of the Director of Undergraduate Studies, a student may substitute one advanced level non-independent study course, or a two-course independent study sequence, in an appropriate science department in Trinity College, the School of Engineering, or the School of Medicine for one of the two optional non-laboratory chemistry courses. At least nine courses above the freshman sequence must be completed in chemistry. A course directly paralleling one offered by the chemistry department may not be substituted. Chemistry 201, 203, 205, and 207 are offered also in one-third semester segments; in some instances a student may wish to take some combination of three of these segments by registering for Chemistry 209. Additional details may be obtained from the Director of Undergraduate Studies.

Recommendations. Computer Science 51 or Engineering 51; Mathematics 104; Physics 100. Students planning graduate study in chemistry should consult with advisers regarding appropriate additional courses.

Honors

The department offers a program for graduation with distinction in chemistry. See the section on honors in this bulletin. The program involves two semesters of independent study, taken either in the chemistry department (Chemistry 191, 192) or, with the prior approval of the coordinator of independent study, in an appropriate science department in Trinity College, the School of Engineering, or the School of Medicine. A research paper based upon the independent study and nomination by the research supervisor form the basis for consideration by a departmental committee. The committee may recommend the student for graduation with distinction in chemistry. Additional details may be obtained from the Director of Undergraduate Studies.

Chinese

For courses in Chinese, see Asian and African Languages.

Classical Studies (CS)

Professor Herington, *Chairman*; Associate Professor Boatwright, *Director of Undergraduate Studies*; Professors Newton, Oates, and Richardson; Associate Professors Burian, Riggsby, Stanley, and Younger; Professor Emeritus Willis

Majors are available in this department.

The objective of classical studies is to increase knowledge and understanding of the roots of Western culture in the civilizations of Greece and Rome. Toward this aim, the department offers courses and majors in three areas: Latin, Greek, and classical studies. Concentration in the languages offers students training in exploring at first hand the literature, history, and thought of antiquity. In the process, students will gain a deeper insight into language itself, as well as an appreciation of the problems of interpretation and the varieties of evidence upon which interpretation may be based. For students interested in history, ancient art, or archaeology, courses in classical studies offer a means of assessing the culture and the material remains of Greece and Rome in their own rich and varied context.

A secondary aim is, and has been by a centuries-old tradition, the development of a keener perception and understanding of the cultural forces at work in the contemporary world. As a result, the field of classical studies is an excellent foundation for advanced work in other academic disciplines as well as professional programs in law, medicine, and finance.

GREEK (GRK)

1-2. Elementary Greek. A study of grammar and an introduction to reading. Two courses. *Burian*

10. Intensive Elementary Greek. Accelerated introduction to ancient Greek, combining in one semester the work of Greek 1-2. A study of grammar with selected readings in prose and poetry. Not open to students who have had Greek 1 or 2. Two courses. *Rigsby*

11-12. Elementary Modern Greek. An introduction to literary and conversational demotic Greek. Two courses. *Younger*

63, 64. Intermediate Greek. Introduction to Greek prose and poetry. 63: Plato's *Republic I* or *Apology*. 64: Euripides' *Medea* or Homer's *Odyssey*. One course each. *Staff*

103S, 104S. Studies in Greek Literature. 103S: the literature of classical Greece: Herodotus and Aristophanes. 104S: the literature of archaic Greece: Homer and lyric poets. One course each. *Burian or Herington*

117T. Greek Prose Composition. The course content is determined by the needs of the students enrolled. One course. *Staff*

181S, 182S. Greek Seminar. Intensive introduction to the language and the literature, offered only in the summer. Prerequisite: proficiency in another language. One course each. *Staff*

200. Intensive Survey of Greek Literature I. A chronological and thematic history of Greek literature. Readings in representative texts of the major writers, including the early poets and classical authors. One course. *Staff*

201. Intensive Survey of Greek Literature II. A chronological and thematic history of Greek literature. Readings in representative texts of the major classical and later authors. One course. *Staff*

203. Homer. Problems of language and structure in the *Iliad*; present state of Homeric scholarship. One course. *Stanley*

205. Greek Lyric Poets. Fragments of the early lyric poets; selected odes of Pindar and Bacchylides. One course. *Burian, Herington, or Stanley*

207. The Dramatists. Readings and studies of selected plays by the major playwrights Aeschylus, Sophocles, Euripides, and Aristophanes. One course. *Burian or Herington*

222. The Historians. Readings and studies in the major Greek historians Herodotus, Thucydides, and Xenophon. One course. *Herington or Oates*

Courses offered each year on demand in consultation with the Director of Undergraduate Studies:

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors and seniors. One course each. *Staff*

193, 194. Directed Research in Greek. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. One course each. *Staff*

LATIN (LAT)

1-2. Elementary Latin. Study of the structure of the language (forms, vocabulary, syntax, and pronunciation); selected readings in prose and poetry. Two courses. *Stanley*

63, 64. Intermediate Latin. Introduction to Latin prose and poetry. 63: selected prose, including Caesar. 64: three books of Vergil's *Aeneid*. One course each. *Boatwright*

100. This number represents course credit for a score of 4 or 5 on one or more of the College Board Advanced Placement tests in Latin. One course.

103S, 104S. Studies in Latin Literature. 103S: the Late Republic, including Catullus and Cicero. 104S: the Age of Augustus, including Horace and Livy. One course each. *Boatwright or Newton*

105S. Ovid: The Metamorphoses. The poem studied as representative of Ovid's varied narrative art, as the largest-scale Roman treatment of classical myths, and in the light of the distinctively Ovidian attitude toward Augustanism. One course. *Newton*

107S. Vergil's Aeneid. Reading and analysis of the *Aeneid*, with particular attention to stylistics and historical setting. One course. *Newton*

108S. Lyric and Occasional Poetry. Readings in the works of Catullus, Horace, and Martial. One course. *Newton or Richardson*

111S. Elegiac Poets. The traditions of Latin love elegy and its development in Propertius, Tibullus, and Ovid. One course. *Richardson*

112S. Roman Comedy. Representative plays of Plautus and Terence with lectures on the genre and its Greek forebears. One course. *Richardson*

114S. The Historians. Readings in representative historical writing chosen from Caesar, Sallust, Livy, and Tacitus. One course. *Boatwright or Richardson*

116S. Lucretius. The *De Rerum Natura* studied as poetry and philosophical thought. One course. *Newton or Richardson*

117T. Latin Prose Composition. The course content is determined by the needs of the students enrolled. One course. *Staff*

181S, 182S. Latin Seminar. Intensive introduction to the language and the literature, offered only in the summer. Prerequisite: proficiency in another language. One course each. *Staff*

200. Intensive Survey of Latin Literature I. A chronological and thematic history of Latin literature. Readings in representative texts of the major Republican authors. One course. *Staff*

201. Intensive Survey of Latin Literature II. A chronological and thematic history of Latin literature. Readings in representative texts of the major authors of the Late Republic and Empire. One course. *Staff*

206. Cicero. One course. *Richardson*

207S. Vergil's Aeneid. Same as 107S, except additional term paper required. One course. *Newton*

211S. Elegiac Poets. Same as 111S, except additional term paper required. One course. *Richardson*

214S. The Historians. Same as 114S, except additional term paper required. One course. *Boatwright or Richardson*

221. Medieval Latin. Selected works of the Latin Middle Ages from Prudentius to the humanists. Genres studied usually include the hymn, sequence, drama, lyric, saints' lives, chronicle, epic, and epistle. C-L: Medieval and Renaissance Studies. One course. *Newton*

Courses offered each year on demand in consultation with the Director of Undergraduate Studies:

191, 192. Independent Study. Directed reading and research. Open to qualified juniors and seniors. One course each. *Staff*

193, 194. Directed Research in Latin. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. One course each. *Staff*

Courses Currently Unscheduled

106S. Roman Satire

204. Epic of the Silver Age

205. The Roman Novel

208S. Lyric and Occasional Poetry

CLASSICAL STUDIES (CS)

11S. Greek Civilization. The culture of the ancient Greeks from the Bronze Age to Alexander the Great: art, literature, history, philosophy, and religion. Not open to students who have had Classical Studies 53 or History 53. One course. *Staff*

12S. Roman Civilization. The culture of ancient Romans from their beginnings to Constantine: art, literature, history, philosophy, and religion. Not open to students who have had Classical Studies 54 or History 54. One course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

53. Greek History. The political and intellectual history of the Hellenes from earliest times to the death of Alexander the Great. Not open to students who have had Classical Studies 11S. C-L: History 53. One course. *Rigsby*

54. Roman History. The Roman Republic and Empire to the Late Antique. Not open to students who have had Classical Studies 12S. C-L: History 54. One course. *Boatwright*

63. The Epic. Reading in translation of major epics from antiquity and the Middle Ages, such as *Gilgamesh*, Homer's *Iliad* and *Odyssey*, Vergil's *Aeneid*, and *Beowulf*. One course. *Burian*

64. Drama of Greece and Rome. Reading in translation of Greek and Roman tragedies (Aeschylus, Sophocles, Euripides, Seneca) and comedies (Aristophanes, Menander, Plautus, Terence). C-L: Drama 64. One course. *Burian*

93. History of Ancient Philosophy. Prerequisites: for freshmen, previous philosophy course and consent of instructor. See C-L: Philosophy 93. One course. *Ferejohn or Mahoney*

101. Science and Technology in the Ancient World. Technical innovation and scientific thought in the ancient Near East, Greece, and Rome. C-L: History 100. One course. *Rigsby*

102. History of Greek and Roman Civil Law. The development of law from the early Greek *polis* and Rome of the XII tables to the *Digest* of Justinian, emphasizing civil law and procedure. C-L: History 103. One course. *Oates*

103. Religion in Greece and Rome. Religious thought, rituals, and institutions from Homer to late antiquity, excluding Christianity. C-L: History 125. One course. *Boatwright or Riggsby*

104. Women in the Ancient World. The perception and reality of the roles, functions, and status of women from the time of Homer to late antiquity. C-L: History 126 and Women's Studies. One course. *Boatwright*

115. The Classical Tradition. The notion of the "classical" from the creation of the archetype to the present. One course. *Burian*

117. Ancient Mythographers. Myth in classical and medieval writers from Hesiod to Boccaccio. C-L: Medieval and Renaissance Studies. One course. *Newton*

121. The Art of Ancient Italy. See C-L: Art 121. One course. *Castriota*

122. Art and Myth in Ancient Greece. See C-L: Art 122. One course. *Castriota*

123. Greek Art and Archaeology I. Greek architecture, sculpture, and painting from the Bronze Age through the Classical period. C-L: Art 123. One course. *Younger*

124. Greek Art and Archaeology II. Architecture, sculpture, painting, and mosaics from the Classical period through the Greco-Roman period. C-L: Art 124. One course. *Younger*

125. The City in Antiquity. See C-L: Art 125. One course. *Castriota*

128. Art of the Roman Empire. See C-L: Art 128. One course. *Castriota*

129. The Age of Justinian. See C-L: Art 129; also C-L: Medieval and Renaissance Studies. One course. *Wharton*

131. Byzantine Art and Architecture. See C-L: Art 131. One course. *Wharton*

135. Alexander the Great. His career and the effects of his conquests. C-L: History 181. One course. *Oates*

145. Rome: History of the City. The development of the urban plan and its major monuments through the ages; the influence of the ancient Republic and Empire, the Papacy, and the modern secular state; change and continuity in artistic forms and daily life. Taught on site in Italy in summer. C-L: Art 126. One course. *Boatwright or Burian*

147. Ancient Greece. On-site study of the cultures in Greece from Neolithic to Medieval, concentrating on Athens, the Peloponnese, Crete, and the Cyclades. Summer program in Greece. Prerequisite: Classical Studies 11S, 53, 123, or 124, or History 53, or consent of instructor. C-L: Art 115. One course. *Younger*

155. The Aegean Bronze Age. Application of archaeological techniques and procedures to problems in the development of the Minoan and Mycenaean civilizations. C-L: Art 114. One course. *Younger*

161S. Athens. The city from antiquity (c. 1500 B.C.) to the present, concentrating on its monuments, self-image, and influence. C-L: Art 116S. One course. *Younger*

162. Pompeii. Contributions of the city to knowledge of ancient Roman life: its history, houses and temples, amusements, and municipal administration. C-L: Art 117. One course. *Richardson*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors and seniors. One course each. *Staff*

193, 194. Directed Research in Classical Studies. Research culminating in the writing of one longer or two shorter papers as partial fulfillment of the requirements for graduation with distinction. Open only to senior majors. One course each. *Staff*

195S, 196S. Junior Seminars in Classical Studies. Specific aspects of the history, art, and literature of classical Greece and Rome. Open only to qualified juniors and seniors; some knowledge of classical studies and history desirable, but not strictly necessary. Topics have included: sexual roles in antiquity, and Imperial Rome. One course each. *Staff*

197S. Seminar for Majors. An intensive investigation into a current problem in classical studies, designed to teach methodology as well as knowledge of ancient and modern evidence and scholarship. Required of majors in Latin, Greek, and classical studies. One course. *Staff*

211S. Plato. Selected dialogues. C-L: Philosophy 211S. One course. *Ferejohn*

217S. Aristotle. Selected topics. C-L: Philosophy 217S. One course. *Ferejohn*

220S. Studies in Greek Art. Prerequisite: consent of instructor. See C-L: Art 220S. One course. *Castriota*

222. Fifth and Fourth Century Greece. From the Persian Wars to the dominance of Philip of Macedon. C-L: History 260. One course. *Oates or Riggsby*

223. Alexander and the Hellenistic World. The achievements and legacy of Alexander the Great and the rise of Roman power in the Eastern Mediterranean. C-L: History 261. One course. *Oates*

224. The Roman Republic. The rise of Rome, to its mastery of the Mediterranean; the political, social, and intellectual consequences. C-L: History 263. One course. *Boatwright or Riggsby*

225. The Roman Empire. The foundation, consolidation, and transformation of Roman rule from Augustus to Diocletian. C-L: History 264. One course. *Boatwright*

227S. Studies in Roman Art. Prerequisite: consent of instructor. See C-L: Art 221S. One course. *Castriota*

230S. Medieval and Byzantine Art and Architecture. Prerequisite: consent of instructor. See C-L: Art 230S; also C-L: Medieval and Renaissance Studies. One course. *Wharton*

231S. Greek Sculpture. C-L: Art 222S. One course. *Stanley*

232S. Greek Painting. C-L: Art 223S. One course. *Stanley*

233S. Greek Architecture. Development of form and function in the various religious, civic, and domestic building types, from the Bronze Age through the Hellenistic period. C-L: Art 224S. One course. *Richardson*

235S. Roman Architecture. C-L: Art 225S. One course. *Richardson*

236S. Roman Painting. The techniques, iconography, and use in decoration. C-L: Art 226S. One course. *Richardson*

258. The Hellenistic and Roman East. The social and cultural history of the Greco-Roman world, concentrating on papyrological evidence. Prerequisite: knowledge of ancient Greek and Latin. One course. *Oates*

Courses Currently Unscheduled

221. Archaic Greece

226. Late Antiquity

THE MAJOR

Students may choose first or second majors in Greek, Latin, or in classical studies (ancient history, civilization, or archaeology).

Students majoring in either Greek or Latin who contemplate graduate work are reminded of the necessity for competence in both languages and a reading knowledge of French and German for all higher degrees.

Prospective second majors in Latin, Greek, or classical studies are urged to consult with the Director of Undergraduate Studies at the earliest feasible time, preferably by the sophomore year.

Majors are eligible for nomination to one semester during their junior year at the Intercollegiate Center for Classical Studies in Rome, of which Duke University is a founding member, or at the College Year in Athens, at a cost comparable to that of a semester at Duke. Financial assistance at Duke can usually be transferred, and arrangements are made through the University. Courses in Greek, Latin, ancient history, and archaeology taken in these programs are counted toward the major requirements. For further information, see the section on study abroad.

Greek

Prerequisite. Greek 2 or equivalent.

Major Requirements. Six courses in Greek above the level of Greek 12, and Classical Studies 197S. In addition, students will be required to pass an examination testing proficiency in Greek composition or to complete Greek 117T. Students entering with three or more years of ancient Greek are urged to consult with the Director of Undergraduate Studies to develop a program suited to their specific needs and interests.

Related Work. Greek majors normally take at least four courses in Latin and are also encouraged to take course work in ancient history and/or archaeology. The nature and amount of related work, however, may vary with the student.

Latin

Prerequisite. Latin 64 or equivalent.

Major Requirements. Six courses in Latin above the level of Latin 100, and Classical Studies 197S. In addition, students will be required to pass an examination testing proficiency in Latin composition or to complete Latin 117T.

Related Work. Latin majors normally take at least four courses in Greek and are also encouraged to take course work in ancient history and/or archaeology. The nature and amount of related work, however, may vary with the student.

Classical Studies (Ancient History, Civilization, or Archaeology)

Prerequisites. Classical Studies 11S and 12S; or 53 and 54; or 57S and 58S.

Major Requirements. Eight courses at the 100 level or above, including Classical Studies 197S and at least one other seminar or course of independent study. Reading knowledge of Latin or Greek to the level of Latin 64 or Greek 64. Two courses in the ancient languages above that level may be counted toward the major.

Honors

The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

Comparative Area Studies Program (CST)

Associate Professor Gordon, *Director*

A major is available in this program.

The undergraduate major in comparative area studies offers a Bachelor of Arts degree to students interested in the interdisciplinary study of societies and cultures of a particular region of the world. Students complement their study with either a concentration in a second world area or in the comparative study of international problems.

The major allows a student to combine language study with courses in a variety of disciplines. As in area studies programs elsewhere, the result is a sustained focus on a single world area, tailored to fit the student's interest. Comparative Studies at Duke, however, is distinct from most such programs in several respects. The primary concentration encourages study of language, literature, religion, and art of the chosen area as well as analysis of its social, historical, and political roots and problems. The secondary concentration imparts breadth of focus and a comparative perspective to the course of study. And the required course on comparative methods focuses attention on the particular disciplinary concerns and approaches of the social sciences and humanities.

Students in the program are currently studying Latin America, the Caribbean, Africa, the Middle East, Russia, South Asia, East Asia, Western Europe, and Canada. Many comparative area studies majors "double-major" in comparative area studies and in such fields as anthropology, history, political science, Spanish, and French. Although the program provides all students with a solid background in liberal arts, it is specifically designed for those with career objectives in academia, government (especially the foreign service), international business, international law, health and environmental programs, the United Nations and international agencies, and private-international religious or service organizations.

The major draws its offerings from courses taught by over eighty Duke professors in a dozen cooperating departments. Interdisciplinary and intercultural courses have been designed specifically for majors in the program to help place those societies chosen for specialization in a broad comparative perspective. These courses stress the interrelationship of developed and underdeveloped societies and probe the difficulties and advantages of comparative, interdisciplinary, and intercultural research.

The program is administered by its director and an advisory committee representing the various areas and cooperating departments.

Advising: Students must identify their primary area focus. Faculty members with expertise in each area are available to provide advice concerning selection of an area and course work in the major. Students wishing to specialize in an area not indicated in the categories of courses that follow will be required to submit a proposed course of study to the advisory committee for approval. Selection of area is normally done by the end of the sophomore year. The program encourages close relationships between faculty and students working in similar areas.

Study Abroad or on Another Campus: The program encourages qualified and interested students to engage in sustained study abroad in their chosen area for a semester or for an academic year. Duke students are eligible for a variety of programs now operating in Africa, Asia, Canada, Latin America, the Soviet Union, and Western Europe. Students can also take advantage of special programs in the United States for intensive language training, legislative or foreign service study in Washington, and internship programs at the United Nations. Occasionally summer internships in a variety of structured programs, including international business, are available for qualified students.

The courses listed below may be taken for credit as introductory courses, comparative courses, and area courses. Others may be selected with the approval of the Director. Courses in basic language instruction are not included, but courses in advanced language and literature that can be used to meet the language requirement (not the area requirement) for the major are shown under the appropriate headings. For a complete description, including cross-listings, consult the listing under the appropriate department or under Interdisciplinary Courses.

INTRODUCTORY COURSES

Anthropology 94. Introduction to Cultural Anthropology. *Staff*

Comparative Literature 101. Introduction to the Study of Literature and Society. *Willis*

History 25. Introduction to World History: To 1700. *Staff*

History 26. Introduction to World History: Since 1700. *Staff*

History 75, 76. The Third World and the West. *Bergquist, R. Davis, Dirlik, Ewald, Gordon, or Richards*

Interdisciplinary Course 109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. *Staff*
Music 136. Introduction to Non-Western Music. *Seebass*
Political Science 92. Comparative Politics. *Staff*
Religion 57. Introduction to the Religions of Asia. *Corless, Lawrence, Partin, or Robinson*
Sociology 110. Comparative Sociology. *Gereffi, Myers, Smith, or Tiryakian*

COMPARATIVE COURSES

Anthropology

114. Gender Inequality. *Quinn*
119. Language, Culture, and Society. *Apte or Weller*
152S. Food in Cross-Cultural Perspectives. *Apte*
155. Anthropological Approaches to Religion. *Weller*
160S. Anthropology and Literature. *Apte*
239. Culture and Ideology. *Weller*
255S. Heroes and Heroics: Culture and the Individual. *Fox*

Comparative Literature

121. Introduction to Non-Western Literatures. *Cooke and Fowler*
129. Latin American Literature. *Dorfman or Fein*
135. The Novel of the Self: East and West. *Fowler*
140. The Great Mother: Archetype or Stereotype? *Wang*
155. Comparative Perspectives in Literature and Social Change: From Plantation to City. *Willis*
185. Psychoanalysis, Literature, and Film. *Gaines*

Economics

219S. Economic Problems of Underdeveloped Areas. *Kelley or Naylor*
286S. Economic Policy Making in Developing Countries. *Gillis*

History

120. History of Socialism and Communism. *Lerner*
123S. Madness and Society in Historical Perspective. *Miller*
167S. United States and Canadian Constitutional Issues. *Cahow*
168S. The Atlantic Slave Trade. *Gaspar*
239S. History of Socialism and Communism. *Lerner*

Interdisciplinary Courses

120A. Perspectives on Food and Hunger. *Johns*
125. Strategies of Comparative Analysis. *Staff*
140. The Great Mother: Archetype or Stereotype? *Wang*
150S. Comparative Area Studies Senior Seminar. *Gordon*
234S. Political Economy of Development: Theories of Change in the Third World. *Bergquist, Fox, Gereffi, or Smith*

Political Science

107. Comparative Environmental Policies. *McKean*
155. Politics and Economics of Developing Areas. *Bates or Braibanti*
163. Gender, Politics, and Policy: The Third World Case. *O'Barr*
173S. Political Economy of World Food Problems. *Johns*
195. Comparative Political Behavior in the U.S. and Canada. *Kornberg*
212S. Domestic Structures and Foreign Policies of Advanced Democratic States. *Grieco*
231S. Crisis, Choice, and Change in Advanced Democratic States. *Kitschelt*
237S. Comparative Public Policy. *Kitschelt*
242S. Comparative Law and Policy: Ethnic Group Relations. *Horowitz*
249. Comparative International Development and Technology Flow. *Braibanti*
259S. Low Intensity Conflict and the Lessons of Vietnam. *Lomperis*
262S. International Communism. *Hough*
277. Comparative Party Politics. *Kornberg or Lange*
284S. Public Policy Process in Developing Countries. *Ascher*
293. Federalism. *Leach*

Public Policy Studies

284S. Public Policy Process in Developing Countries. *Ascher*
286S. Economic Policy Making in Developing Countries. *Gillis*

Religion

125. Women and Sexuality in the Christian Tradition. *Clark*
142. Comparative Mythology. *Partin*
143. Mysticism. *Staff*
157. Bioethics in Comparative Contexts. *McCollough*

282. Myth and Ritual. *Robinson and staff*

Sociology

- 118. Sex, Gender, and Society. *O'Rand*
- 170. Mass Communication. *Smith*
- 171. Comparative Health Care Systems. *Maddox*
- 179. Modern Nationalist Movements. *Tiryakian*
- 180. Modern Revolutions. *Tiryakian*
- 182. Media in Comparative Perspective. *Paletz or Smith*
- 214. Comparative and Historical Methods. *Gereffi, Smith, or Tiryakian*
- 222B. Comparative Aspects of Societal Transformation. *Gereffi, Simpson, Smith, or Tiryakian*

AREA COURSES: AFRICA

Anthropology

- 122. Modern Africa. *O'Barr*

Comparative Literature

- 128. Writings in the Pan-African Tradition. *Willis*

History

- 115, 116. History of Africa. *Ewald*
- 179. History of South Africa, 1600-1960. *Ewald*
- 195S.23, 196S.23. Issues in the History of Tropical Africa. *Ewald*

Political Science

- 161S. Comparative Government and Politics: Africa. *Bates, Johns, or Widner*
- 171. Politics of South African Apartheid. *Johns*
- 280S. Comparative Government and Politics: Sub-Saharan Africa. *Staff*

Religion

- 265. Religions of the West Africa Diaspora. *Lincoln*

AREA COURSES: CANADA

English

- 186. Canadian Literature in English. *Staff*

French

- 114. Language and Civilization of Quebec. (Taught in Montreal.) *Staff*
- 131S. French in the New World. *Hull*
- 169. The Contemporary Novel in French Canada. *Staff*

History

- 183S. Canada from the French Settlement. *Cahow*

Interdisciplinary Courses

- 184. An Introduction to Canada and Canadian Issues. *Cahow*
- 282S. Canada. *Cahow*

AREA COURSES: EAST ASIA

Anthropology

- 121. China: Tradition and Transformation. *Weller*
- 131. Socialism and Society in China. *Weller*
- 163. Foundations of Chinese Civilization. (Taught in China.) *Staff*

Art

- 165. Far Eastern Ceramics. *Lee*

Chinese

- 125, 126. Advanced Chinese. *Staff*
 - 135, 136. Introduction to Modern Chinese Literature. *Kunst*
 - 141S. The Fantastic in Chinese Fiction. *Wang*
 - 142. Classical Chinese Nature Poetry in Translation. *Wang*
 - 166S. The I Ching, or Book of Changes. *Kunst*
 - 171. The Novel in Modern China. *Kunst*
 - 182S. Classical Readings in Chinese Philosophy (in Chinese). *Wang*
- Additional Chinese courses are taught in Beijing and Nanjing as part of the Duke Study in China Program.

History

- 139. China since 1949: The People's Republic. *Dirlik*
- 141. Imperial China. *R. Davis*
- 142. China: Roots of Revolution. *Dirlik*

- 143. Ancient and Early Modern Japan. *Gordon*
- 144. The Emergence of Modern Japan. *Gordon*
- 163. Foundations of Chinese Civilization. (Taught in China.) *Staff*
- 195S.07, 196S.07. Socialism and Revolution in East Asia. *Dirlik*
- 195S.17, 196S.17. Problems in the History of Modern Japan. *Gordon*
- 195S.30, 196S.30. Traditions in China and the West. *R. Davis*
- 245, 246. Social and Intellectual History of China. *R. Davis and Dirlik*

Japanese

- 155, 156. Readings in Modern Japanese. *Fowler and staff*
- 161. Modern Japanese Fiction in Translation. *Fowler*
- 175. Structure of Japanese. *Nagai*
- 183, 184. Topics in Japanese. *Fowler and staff*

Music

- 138. Music of East and Southeast Asia. *Seebass*

Political Science

- 111. Contemporary Japanese Politics. *McKean*
- 132. Politics of Asia. *Lomperis*
- 149. United States and East Asia. *McKean*
- 169. Politics in Revolutionary China. *McKean*
- 211S. Current Problems and Issues in Japanese Politics. *McKean*

Religion

- 141. Religions of China and Japan. *Corless*
- 149. Buddha and Buddhism. *Corless*
- 218. Religion in Japan. *Corless*
- 287. The Scriptures of Asia. *Staff*
- 288. Buddhist Thought and Practice. *Corless*

AREA COURSES: LATIN AMERICA

Anthropology

- 124S. The American Indian. *Staff*
- 127. Social Transformations in Central America. *Smith*
- 128. Caribbean Societies and Cultures. *Domínguez*
- 173. Revolutions in Latin America. *Smith*

Art

- 178. Pre-Columbian Art and Architecture. *Sund*

History

- 128. The United States and Latin America. *Bergquist*
- 131. History of Mexico and the Spanish Caribbean in the Nineteenth and Twentieth Centuries. *TePaske*
- 173. History of Spain from Late Medieval Times to the Present. *TePaske*
- 174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*
- 177. Modern Latin America. *Bergquist*
- 195S.22, 196S.22. Problems in Latin-American History. *Bergquist or TePaske*
- 265S. Problems in Latin American History. *Bergquist*

Political Science

- 114. United States Foreign Policy and Latin America. *Staff*
- 151. Introduction to Latin-American Politics. *Staff*
- 253S. Comparative Government and the Study of Latin America. *Staff*

Portuguese

- 181. Brazilian Portuguese. *Staff*
- 182. Topics in Portuguese and Brazilian Literature and Culture. *Staff*

Spanish

- 105, 106. Introduction to Spanish-American Literature. 105: *Ross*; 106: *Fein*
- 107S. Spanish-American Short Fiction. *Fein*
- 108S. Spanish Traditional Poetry. *Garci-Gómez*
- 121. Latin American Literature in Translation. *Dorfman or Fein*
- 131. Topics of Hispanic Civilization. *Staff*
- 146. The Spanish-American Novel. *Fein*
- 166. Nineteenth-Century Prose Fiction. *Pérez Firmat or Sieburth*
- 171. Literature of Contemporary Spain. *Osuna*
- 210. History of the Spanish Language. *Garci-Gómez*
- 245. Modern Spanish-American Poetry. *Fein*
- 246. Modern Spanish-American Fiction. *Pérez Firmat*

AREA COURSES: MIDDLE EAST

Anthropology

126. Middle East: Wars, Revolutions, and Social Change. *Domínguez*
147, 148. Introduction to Islamic Civilization. *Lawrence and staff*

Arabic

100. North African Culture. (Taught in Morocco.) *Cooke*
171. Modern Arabic Literature in Translation. *Cooke*
173S. Women in Arabic Literature. *Cooke*

History

- 101G, 102G. Introduction to Islamic Civilization. *Lawrence and staff*
159S. The Palestine Problem and United States Public Policy. *Kuniholm*

Interdisciplinary Courses

- 162, 163. Introduction to Islamic Civilization. *Lawrence and staff*
164. History and Religions of North Africa. (Taught in Morocco.) *Lawrence*

Political Science

- 177, 178. Contemporary Social and Political Development in the Islamic World. *Braibanti*
235S. Comparative Development of Islam. *Braibanti*

Public Policy Studies

- 175S. The Palestine Problem and United States Public Policy. *Kuniholm*
257. United States Policy in the Middle East. *Kuniholm*

Religion

110. Archaeology and Art of the Biblical World. *C. Meyers or E. Meyers*
134. Jewish Mysticism. *Bland*
136. Contemporary Jewish Thought. *Bland or E. Meyers*
152. Islamic Mysticism. *Lawrence*
162, 163. Introduction to Islamic Civilization. *Lawrence and staff*
283. Islam and Modernism. *Lawrence*
284. The Religion and History of Islam. *Partin*

AREA COURSES: RUSSIA AND EAST EUROPE

Economics

293. Soviet Economic History. *Trembl*
294S. Soviet Economic System. *Trembl*

History

120. History of Socialism and Communism. *Lerner*
161, 162. History of Modern Russia. *Miller*
180. The Soviet Experience. *Lerner*
195S.18, 196S.18. Problems in the History of Russia before 1917. *Lerner or Miller*
201S. The Russian Intelligentsia and the Origins of the Revolution. *Miller*
202S. The Russian Revolution. *Miller*
239S. History of Socialism and Communism. *Lerner*
262. Problems in Soviet History. *Lerner*

Political Science

165. Government and Politics of the Soviet Union. *Hough*
166. Soviet Foreign Relations. *Hough*

Russian

100. Studies in Russian Culture. (Taught in Leningrad.) *Andrews*
124. Masters of Russian Short Fiction. *Staff*
161, 162. Introduction to the Russian Novel. *Krynski*
175. Tolstoy. *Staff*
176. Dostoevsky. *Staff*
185S. Introduction to Slavic Linguistics. *Andrews*
186S. History of the Russian Language. *Pugh*
196. Readings in Modern Russian. *Staff*
225. Tolstoy. *Staff*
232. Dostoevsky. *Staff*

AREA COURSES: SOUTH ASIA

Anthropology

- 101, 102. Introduction to the Civilizations of Southern Asia. *Apte or Fox*

History

- 140. Medieval and Early Modern India, Pakistan, and Bangladesh. *Richards*
- 164. India, Pakistan, and Bangladesh: 1750 to the Present. *Richards*
- 193, 194. Introduction to the Civilizations of Southern Asia. *Fox and staff*
- 195S.21, 196S.21. Problems in Indian History. *Richards*

Interdisciplinary Courses

- 101, 102. Introduction to the Civilizations of Southern Asia. *Fox and staff*
- 162, 163. Introduction to Islamic Civilization. *Lawrence and staff*

Music

- 138. Music in East and Southeast Asia. *Seebass*

Political Science

- 132. Politics of Asia. *Lomperis*
- 177, 178. Contemporary Social and Political Development in the Islamic World. *Braibanti*

Religion

- 140. Religions of India. *Lawrence and staff*
- 145. Social Issues in Contemporary Hinduism. *Robinson*
- 149. Buddha and Buddhism. *Corless*
- 160, 161. Introduction to the Civilizations of Southern Asia. *Fox and staff*
- 217. Islam in India. *Lawrence*
- 284. The Religion and History of Islam. *Partin*
- 287. The Scriptures of Asia. *Staff*
- 288. Buddhist Thought and Practice. *Corless*

AREA COURSES: WESTERN EUROPE**Art**

- 160. Rococo to Neoclassicism: Eighteenth-Century European Art. *Staff*
- 161. Nineteenth-Century European Art. *Sund*
- 164. Art of the Romantic Period. *Staff*
- 184. History of Impressionism. *Sund*
- 186. Twentieth-Century Art. *Staff*
- 187. Surrealism. *Staff*

Comparative Literature

- 132. Dada and Surrealism. *Thomas*
- 170. The Modern: Problems of Definition, History, and Language. *Rolleston*

Distinguished Professor Courses

- 196S. Current Political Problems in Western European and Commonwealth Countries. *Cole*

Economics

- 150. History of Economic Thought. *Goodwin or de Marchi*

French

- 107S. Contemporary Ideas. *Staff*
- 136S. Life in Eighteenth-Century France. *Stewart*
- 139. French Civilization. *Tetel*
- 166, 167. Contemporary French Life and Thought. *Staff*
- 256. Modern Literature and History. *Orr*

Germanic Language and Literature

- 127S. Contemporary Germany. *Bessent*
- 129. Deutsche Kulturgeschichte. *Staff*
- 130. German Life and Thought. *Borchardt*
- 175. Consciousness and Modern Society. *Rolleston*

History

- 104. The Intellectual Life of Europe, 1250-1600. *Robisheaux or Witt*
- 107, 108. Social and Cultural History of England. *Cell or Herrup*
- 117. Early Modern Europe. *Neuschel*
- 119. Modern European Intellectual and Cultural History. *Miller*
- 135. Political, Economic, and Social History of Europe, 1890-1939. *Colton*
- 136. Europe since 1939. *Colton*
- 138. Early Modern Germany. *Robisheaux*
- 171. A History of Women in Europe. *Neuschel*
- 174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TéPaske*
- 182. Politics and Culture in Renaissance Florence. *Witt*
- 195S, 196S. Selected Seminars in European History. *Staff*

- 207, 208. Constitutional History of Britain: The Rise of the Common Law. *Herrup*
 217S, 218S. Western Europe in the Twentieth Century. *Colton*
 229S, 230S. Revolution in Modern Europe, 1789-1919. *Reddy*
 253S, 254S. European Diplomatic History, 1871-1945. *W. Scott*
 267S, 268S. From Medieval to Early Modern England. *Herrup*
 269S, 270S. British History, Seventeenth Century to the Present. *Cell*

Music

125. Masterworks of Music. *Staff*
 144. Bach and His Time. *Silbiger*
 156S. Music History II: Late Renaissance, Baroque. *Bartlet, Higgins, Seebass, or Silbiger*
 157S. Music History III: Rococo and Classic. *Bartlet, Seebass, Silbiger, or Todd*
 158S. Music History IV: Romanticism to the Early Modern Period. *Bartlet, Silbiger, or Todd*

Political Science

115. Politics and Society in West Germany. *Kitschelt*
 135. Political Development of Western Europe. *Kitschelt or Lange*
 136. Comparative Government and Politics: Western Europe. *Kitschelt, Lange, or Tsebelis*
 216S. Evolutions of European Marxism. *Booth*
 225. Topics in Comparative Government and Politics: Western Europe. *Kitschelt or Lange*
 232. Political Economy: Theory and Applications. *Lange*

Spanish and Portuguese

See appropriate listings under Latin America.

THE MAJOR

Introductory Courses: A student must take an introductory course emphasizing comparative approaches from each of two departments (two courses). See the listing under Introductory Courses.

Foreign Languages Requirement: Four semesters of courses for a single language of the primary area are required. Students with advanced placement credits or other evidence of foreign language proficiency are *not* exempted from this requirement. However, in the following cases students may *substitute* one or two non-language courses to meet this requirement: (1) if a second year of a language is not taught at Duke or (2) if no language course is available at a sufficiently advanced level. In these cases, approved humanities or social science courses taught in a foreign language, or a year of general linguistics or literature in translation, may be substituted for the second year of a language. The specific language courses are too numerous to list here. Area advisers should be consulted for specific approval of the language choice unless it conforms to the list below.

Africa: Swahili; relevant European languages such as French may be used if appropriate to specific programs.

East Asia: Chinese, Japanese.

South Asia: Hindi-Urdu.

Middle East: Arabic, Persian; or modern Hebrew for persons specializing in Israel.

Latin America: Spanish; Portuguese for those specializing in Brazil.

Russia and Eastern Europe: Russian.

Western Europe: French, German, Italian, Portuguese, Spanish.

Canada: French.

Area Courses: Four semester courses in the geographical area of special interest (the area of the language studied). The areas and courses are listed above. Others may be selected with the consent of the Director.

Concentration: A student must undertake three courses in one of the following concentrations: (a) comparative courses, examples of which are listed above; or (b) a second geographical area. Students who choose Western Europe or Russia/Eastern Europe as a primary area must take a non-European or comparative secondary area. Similarly, students who choose either Latin America or the Caribbean as their primary area may not take the other of this pair as the secondary area.

Comparative Methods:

Classes of 1989-91: All students must take either the comparative methods course (Interdisciplinary Course 125) in their junior or senior year *or* the Honors Seminar (Inter-

disciplinary Course 1505) in their senior year. The former course (Interdisciplinary Course 125) will be taught by faculty members affiliated with Comparative Area Studies and is open only to majors. The purpose of this course is to teach students the various strategies that can be employed in making appropriate comparisons within and across distinct regions of the world. The course will combine a lecture format with discussion sections, and students will be encouraged to write papers that reflect the cross-cultural and interdisciplinary objectives of the major.

Classes of 1992 and after: All students must take the comparative methods course in their junior or senior year. In addition, students seeking honors in the major must submit a senior honors paper, usually written in the honors seminar.

Honors Seminar: There will be an optional honors seminar open to seniors in the major. Candidates will apply in their junior year and be selected by the Comparative Area Studies faculty. Selection criteria include the feasibility of the proposed topic and the student's motivation and skills to carry it out successfully.

Inquiries should be addressed to the Director, Comparative Area Studies, 2122 Campus Drive.

Comparative Literature Program (CL)

Associate Professor Burian (classical studies), *Chairman of the Committee on Comparative Literature*; Professors Anderson (English), Fish (English), Herington (classical studies), Jameson (comparative literature), Lentricchia (English), A. Patterson (comparative literature), L. Patterson (English), Ryals (English), B. H. Smith (English), Stewart (Romance languages), Tetel (Romance languages), Tompkins (English), Torgovnick (English), and Wardropper (Romance languages); Associate Professors Cooke (international studies), DeNeef (English), Fowler (international studies), Orr (Romance languages), Pérez Firmat (Romance languages), Rolleston (Germanic languages), and Thomas (Romance languages); Assistant Professors Gaines (English), Morton (Germanic languages), Wang (international studies), and Willis (international studies)

A major is available in this program.

The program consists of courses linking works from several national literatures through concepts of genre, period, and style; or studying literature through related intellectual structures, e.g., film, philosophy, psychoanalysis. Students contemplating a major in comparative literature should have a reading knowledge of a foreign language and a broad acquaintance with British and American authors. Students taking the major are expected to acquire a reading knowledge of a second foreign language and to familiarize themselves with methods of studying literature in a comparative manner. The program, largely interdisciplinary, is directed by a committee, and the selection of courses for the major requires the approval of the committee. Inquiries concerning eligibility and requirements should be directed to Professor Burian, 315 Carr Building.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

50. What Is Literature? Introduction to the idea of literature from an innovative and questioning position, to a number of major modern thinkers, and to theory in general. The relationship of literature to history; theories of reading and interpretation; and the concepts and structures of thought associated with modernism and postmodernism. One course. *Jameson and A. Patterson*

51. Foundations of Western Literature: Homer to Dante. Classical and medieval texts that have defined the central topics and forms of western literature, including the nature of love; the relation of people to their gods, to death, and to the afterlife; the values and perils of writing itself. One course. *Herington and L. Patterson*

100. Introduction to Comparative Literature. Basic structures of literature understood as fiction-making: the journey, the hero, the storyteller, the goal of community. Texts from

the *Odyssey* to contemporary works, with an introduction to theoretical issues. One course. *Rolleston*

101. Introduction to the Study of Literature and Society. Literature in relation to history, social situation, and culture. Development of modes of interpretation that juxtapose textual features and broader contextual concerns. Readings from western and non-western sources representative of a number of periods and genres. C-L: Comparative Area Studies and Interdisciplinary Course 106. One course. *Willis*

102. Introduction to Media Studies. See C-L: English 82; also C-L: Film and Video. One course. *Gaines and staff*

121. Introduction to Non-Western Literatures. An exploration of such themes as women, war, and the West in twentieth-century literature of East Asia, South Asia, the Middle East, North Africa, and sub-Saharan Africa. C-L: Comparative Area Studies. One course. *Cooke and Fowler*

122. The American Imagination. A syncretic approach to the literature of the Americas, North and South, drawing attention to the underlying homogeneity of New World culture. Borges, Faulkner, Garcia Marquez, Melville, Neruda, Thoreau, and others. One course. *Pérez Firmat*

123. Approaches to Arthurian Romance. Celtic and Latin background to the epic of chivalry; structure of the romance, and its transformations in France, Germany, and England during the High Middle Ages; roles of the medieval poet. C-L: Medieval and Renaissance Studies. One course. *Staff*

125. The Romantic Impulse in the Novel. An exploration of how novels intermix realistic and romantic techniques, forms, themes, and concerns. Fictions by Emily Brontë, Stendhal, Flaubert, Dickens, Dostoevsky, Gide, Nabokov, Barth, and others. One course. *Torgovnick*

126. Toward the Dream Play. Scandinavian progenitors of modern drama. Readings from Kierkegaard, Ibsen (from *Brand* to *When We Dead Awaken*), and Strindberg (pre-Inferno period, *The Dream Play*, chamber plays). One course. *Anderson*

128. Writings in the Pan-African Tradition. Pan-Africanism as a political and cultural movement in this century. Political philosophies of black intellectuals (Garvey, Padmore, DuBois, James) as context for Negritude poetry and novels from black Africa, the Caribbean, and the United States. C-L: Women's Studies. One course. *Willis*

129. Latin-American Literature in Translation. See C-L: Spanish 121; also C-L: Comparative Area Studies. One course. *Dorfman or Fein*

132. Dada and Surrealism. The international dada and surrealist movement in its multiple manifestations: theater, painting, novel, film, autobiography, and manifesto. Knowledge of French or German desirable. One course. *Thomas*

135. The Novel of the Self: East and West. Versions of the modern self in a parallel study of Eastern (primarily Japanese) and Western (English, French, German, and Russian) novels. C-L: Comparative Area Studies. One course. *Fowler*

138. The Politics of Private Life. Contemporary prose works in which the most private questions become reflections on the state and society. Readings: Adorno, Christa Wolf, Blanchot, Barthes, Duras, Gramsci, Kundera, Didion, and Hawkes. One course. *Orr*

140. The Great Mother: Archetype or Stereotype? The Jungian archetype of the Great Mother and the emerging feminist critique of the Jungian model. The dual symbolism of the Feminine as nurturing and devouring Mother, the ambivalent nature of mother-daughter relations, the identification of woman with Eros, and alternatives to the patri-

archal myth of the Mother. Readings include Jungian and feminist theories; Asian, Egyptian, and Greek mythologies; and modern fiction. C-L: Comparative Area Studies, Interdisciplinary Course 140, and Women's Studies. One course. *Wang*

145. The Descent of the Epic. Epic impulses and persistent themes in literary history: Homer, Vergil, Dante, Voltaire, Dostoevsky, T. S. Eliot, and Joyce. One course. *Torgovnick*

155. Comparative Perspectives on Literature and Social Change: From Plantation to City. Representations of rural life in North America, the Caribbean, and Latin America drawn from literary texts and sociological and historical studies. Focus on the rural family as the nexus between individual relationships and the forces of history. C-L: Comparative Area Studies and Interdisciplinary Course 155. One course. *Willis*

156. American Popular Culture. See C-L: English 156. One course. *Willis*

159. Tragedy and the Tragic. Sources, social role, and philosophical implications of tragedy from ancient Greece to Shakespeare and the Elizabethans, the classical French theater and modern times. One course. *Burian*

177. Film Theory. Recent critical developments in Marxist aesthetics, structuralism, semiotics of the image, feminist film theory. Both experimental and Hollywood narrative films. C-L: Film and Video and Women's Studies. One course. *Gaines*

179. Contemporary Science Fiction. Major writers in the tradition of Utopia and Science Fiction since the 1960s, in particular LeGuin, Dick, and Delany. The formal distinction between science fiction and fantasy, innovations in narrative structure, concepts of utopia and dystopia, and the relationship between the genre and the social history of the 1960s and 70s. One course. *Jameson*

180. Writings in the Rural Tradition: From the Caribbean to the American South. Comparative readings of fiction and poetry from the southern United States and the Caribbean, analyzed in relation to the plantation heritage. C-L: English 180. One course. *Willis*

185. Psychoanalysis, Literature, and Film. Genres, styles, and schools in film and literature that attract psychoanalytic readings and raise issues of gender and sexuality: the gothic, horror, melodrama, and romance fiction; surrealism and the avant-garde. C-L: Film and Video and Women's Studies. One course. *Gaines*

187. Studies in Film History. See C-L: English 185; also C-L: Drama 136 and Film and Video. One course. *Clum or Gaines*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year by consent of instructor. One course each. *Staff*

193, 194. Independent Study. Directed readings and research. Open only to qualified students in the senior year by consent of instructor. One course each. *Staff*

199S. Theory and Practice of Literary Translation. Linguistic foundations and historical role of translation. Practical exercises and translation assignments. Prerequisites: working knowledge of a foreign language and consent of instructor. One course. *Burian*

The following courses taught in the Ph.D. program in literature are available to qualified undergraduates by permission of instructor:

251. History of Criticism. One course. *DeNeef, Lentricchia, or Pérez Firmat*

252. Criticism and Literary Theory in the Twentieth Century. One course. *Rolleston and guest lecturers*

253. Philology, Linguistics, and the Roots of Literature. One course. *Thomas*

The 280 series implies prior knowledge of literary theory, past and present. These courses are open to graduate students and qualified seniors only and may be repeated.

281. Paradigms of Modern Thought. One course. *Jameson*

282. Contemporary Literary Theory. C-L: Women's Studies. One course. *Fish, Jameson, Lentricchia, A. Patterson, or Tompkins*

283. Modernism. One course. *Jameson or Lentricchia*

284. The Intellectual as Writer. One course. *Lentricchia or A. Patterson*

285. Literature and Ideology. One course. *Jameson, Lentricchia, or A. Patterson*

286. Topics in Legal Theory. One course. *Fish*

287. Topics in Narrative Analysis. One course. *Jameson*

288. Issues in the History of Literary Theory. One course. *Smith*

289. Topics in Feminist Theory. One course. *Staff*

290. Topics in Psychoanalytic Criticism. One course. *Staff*

291. Topics in Popular Culture and the Media. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

120. Theater of the Absurd

124. Continental Humanism

131. A New Realism

139. Perspectives on Contemporary Fiction

150. Introduction to Literary Criticism

160. An Approach to Comedy

169. The "Classical" Era in European Literature

170. The Modern: Problems of Definition, History, and Language

THE MAJOR

Prerequisites. A reading knowledge of at least one foreign language; a basic survey course in English literature.

Major Requirements. (1) Comparative Literature 100; (2) two courses from those listed under Comparative Literature, or courses of literature in translation that cross national lines and invite comparative interpretation, or courses of literature written in languages that are seldom taught; (3) three courses in a single foreign literature at the 100 level or above, to be read in the original language; (4) acquisition of a second foreign language through at least the intermediate level.

This last requirement may be fulfilled by examination or by completion of such courses as the following: Greek 63, 64 or 181S, 182S; Latin 181S, 182S; German 63, 101, or 181, 182; French 63, 74, or 181, 182; Italian 63 or 181, 182; Russian 63, 64; Spanish 63, 76, or 181, 182; Hindi-Urdu 63, 64; Chinese 63, 64; Japanese 63, 64.

The Committee on Comparative Literature helps students in creating a program which gives both definition and scope to their literature courses in relation to their work in other disciplines.

Computer Science (CPS)

Professor Rose, *Chairman*; Associate Professor Ramm, *Associate Chairman*; Professor Biermann, *Director of Undergraduate Studies*; Professors Gallie, Loveland, Marinos, Patrick,

Reif, A. Rosenberg, Starmer, Trivedi, Utku, and Woodbury; Associate Professors Ballard, C. Ellis, J. Ellis, Greenside, Kedem, Kootsey, and Wagner; Assistant Professors Board, Dugan, Gardner, Holliday, Nadathur, J. Rosenberg, and Szyld; Adjunct Associate Professor Coughran; Adjunct Assistant Professor McHugh

A major is available in this department.

The Department of Computer Science provides courses on the concepts of computing and computers, their capabilities, and uses. In most courses students make extensive use of the available computing facilities. Students who wish to take a single introductory course, as part of their general education, usually elect Computer Science 10 or 51.

In cooperation with the Microelectronics Center of North Carolina (MCNC), the University of North Carolina at Chapel Hill, and other MCNC-affiliated universities in North Carolina, the department often sponsors advanced computer science and other high technology courses originating at other universities. These are available through a closed circuit television and data network belonging to MCNC. Contact the Department of Computer Science for further information on the availability of such courses.

10. Computer Science Fundamentals. An introduction to computers for students who do not intend to major in computer science. Fundamental concepts of the nature of computers and computability, programming, numeric and symbolic data processing. Not open to students having credit for Computer Science 51 or higher. One course. *Staff*

51. Introduction to Computer Programming. Problem solving using a digital computer. Use of a high level algorithmic programming language. Students expected to write a substantial number of programs. Use of a computer in laboratory-style classes utilizing personal computers. One course. *Kootsey and staff*

53. Programming, Analysis, and Design I. Computer programming, data structures, analysis and design of algorithms. Intended as a first course for students in the B.S. degree program. One course. *Staff*

102. Data Structures. Linear lists, trees, multilinked structures, and their use in algorithms. Prerequisite: Computer Science 51, 53, or equivalent. One course. *Staff*

103. Programming, Analysis, and Design II. A continuation of Computer Science 53. Prerequisite: Computer Science 53. One course. *Staff*

104. Computers and Programming. Computer structure, machine language, instruction execution, addressing techniques, and digital representation of data. Computer systems organization, logic design, microprogramming, and interpreters. Symbolic coding and assembly systems. Prerequisite: Computer Science 102 or 103 or consent of instructor. One course. *Ramm and staff*

106. Programming Languages. Syntax and semantics of programming languages. Compilation, interpretation, and programming environments; including programming languages such as Algol, PL/1, Pascal, APL, LISP, and Prolog. Exercises in programming. Prerequisite: Computer Science 104. One course. *Staff*

121. Introduction to Numerical Methods. Numerical solution of systems of linear and nonlinear equations and of ordinary differential equations. Integration. Least squares. Experimental and theoretical estimation of accuracy. Prerequisites: Mathematics 103 and Computer Science 51. One course. *Gallie*

125. Mathematical Foundations of Computer Science. An introduction to theoretical computer science including studies of abstract machines, the language hierarchy from regular sets to recursively enumerable sets, non-computability, and complexity theory. Prerequisites: Computer Science 53 and 103 and Mathematics 103. One course. *Staff*

131. Computer Architecture and Operating Systems. An introduction to computer architectures and multiprogrammed operating systems. CPU designs, memory hierar-

chies, memory management, I/O subsystems, cooperating sequential processes, concurrency control, protection, and distributed systems. Case studies of existing systems. Prerequisite: Computer Science 104. One course. *Staff*

155. Program Design and Construction. Substantial programs. Design specifications, choice of data structures, estimation of programming effort, stepwise development, and program-testing methodology. Programming teams and human factors in system implementation. Advanced topics in use of a procedural language and file management. Prerequisite: Computer Science 104. One course. *Staff*

157. Introduction to Switching and Automata Theory. See C-L: Electrical Engineering 157. One course. *Carroll or Strole*

160. Digital Electronics and Computer Hardware. The basics of DC and AC circuit analysis, digital circuitry, MOS devices and hybrid designs, timing considerations. Switching characteristics of transistors and simple amplifier circuits. Speed, power, fan-in and fanout, and cost as a basis of comparison of different logic families. Applications to digital system design. Prerequisites: Physics 51; and Computer Science 157, Electrical Engineering 157, or equivalent. C-L: Electrical Engineering 160. One course. *Dollas or Duggan*

174. Analysis of Algorithms. Design and analysis of efficient algorithms for sorting, searching, dynamic structure manipulation, path-finding, fast multiplication, and others; nondeterministic algorithms and computationally hard problems. Prerequisites: Computer Science 102 and four semesters of college mathematics. One course. *Loveland or A. Rosenberg*

191, 192. Independent Study. Directed reading and research for qualified juniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for qualified seniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

For Seniors and Graduates

200. Programming Methodology. Practical and theoretical topics including structured programming, specification and documentation of programs, debugging and testing strategies, choice and effective use of programming languages and systems, psychology of computer programming, proof of correctness of programs, analysis of algorithms, and properties of program schemata. Prerequisite: Computer Science 102. One course. *Staff*

201. Programming Languages. Information binding, data structures and storage, control structures, recursion, execution environments, input/output; syntax and semantics of languages; study of PL/1, Fortran, Algol, APL, LISP, SNOBOL, and SIMULA; exercises in programming. Prerequisite: Computer Science 200. One course. *Staff*

202. Applied Discrete Structures. Aspects of discrete mathematics that are essential to the development of computer science. Topics from combinatorics and graph theory, discrete probability theory, and mathematical logic. Prerequisites: Mathematics 103 and 104 or equivalents. One course. *Staff*

204. Computer Network Architecture. Prerequisite: Electrical Engineering 157. See C-L: Electrical Engineering 204. One course. *Strole*

207. Fault-Tolerant Computer Systems. See C-L: Electrical Engineering 207. One course. *Marinos*

208. Digital Computer Design. Prerequisite: Computer Science 157 or consent of instructor. See C-L: Electrical Engineering 208. One course. *Marinos*

209. Microprocessor Fundamentals and Applications. Prerequisites: Computer Science 157 and consent of instructor. See C-L: Electrical Engineering 209. One course. *Marinos*

210. VLSI Systems: An Introduction. A first course in VLSI using the Mead-Conway approach. Topics include (1) the basic components of MOS technology: the transistor and gates constructed therefrom; (2) techniques for composing components into useful logic blocks: array logic, passive logic networks, sequential machines; (3) introduction to techniques for composing logic blocks into systems; and (4) introduction to software systems that aid the design process. Students will complete the design of a small system in NMOS. Taught at the University of North Carolina-Chapel Hill as Computer Science 268. Prerequisite: Computer Science 157 or equivalent. One course. *Staff*

215. Artificial Intelligence. Heuristic versus algorithmic methods; programming of games such as chess; theorem proving and its relation to correctness of programs; readings in simulation of cognitive processes, problem solving, semantic memory, analogy, adaptive learning. Prerequisite: Computer Science 102 or consent of instructor. One course. *Biermann, Loveland, or Nadathur*

221. Numerical Analysis I. Error analysis, interpolation and spline approximation, numerical differentiation and integration, solutions of linear systems, nonlinear equations, and ordinary differential equations. Prerequisites: knowledge of an algorithmic programming language and intermediate calculus. C-L: Mathematics 221. One course. *Gallie or Patrick*

222. Numerical Differential Equations. Numerical methods for solving ordinary and partial differential equations emphasizing nonlinear differential equations. Methods for solving ordinary differential equations that generalize to solve partial differential equations: finite difference, spectral, and finite element methods. Solution of hyperbolic, parabolic, and elliptical partial differential equations arising in scientific problems. Prerequisite: Computer Science 221 or equivalent. C-L: Mathematics 222. One course. *Gardner, Greenside, Rose, or Szyld*

223. Numerical Linear Algebra. Solution of large, sparse linear systems of equations. Storage schemes, graph theory for sparse matrices, different orderings to minimize fill, block factorizations, iterative methods, analysis of different splittings, conjugate gradient methods. Eigenvalue problems, QR factorization, Lanczos method, power method and inverse iteration, Rayleigh quotient. Prerequisite: Computer Science 221 or equivalent. C-L: Mathematics 223. One course. *Gardner, Greenside, Rose, or Szyld*

224. Analysis of Algorithms. Design and analysis of efficient algorithms. Design techniques include recursion, divide-and-conquer, and dynamic programming. Applications include sorting, searching, dynamic structures, pathfinding, fast multiplication, fast Fourier transform. Nondeterministic algorithms. Computationally hard problems. NP-completeness. This course is the same as Computer Science 174 with more advanced-level work required of the student. Prerequisites: Computer Science 102 and four semesters of college mathematics. One course. *Loveland or A. Rosenberg*

225. Formal Languages and Theory of Computation. An introduction to the study of abstract machines and the languages they define, their capabilities, and limitations. Finite-state automata, regular languages, pushdown automata, context-free languages, Turing machines, recursive functions and recursively enumerable sets, noncomputable sets, measures of complexity for algorithms. Prerequisite: four courses in college mathematics. One course. *Loveland or A. Rosenberg*

226. Mathematical Methods for Systems Analysis I. Basic concepts and techniques used in the stochastic modeling of systems. Elements of probability, statistics, queuing theory, and simulation. Prerequisite: four courses in college mathematics. One course. *Trivedi*

227. Mathematical Methods for Systems Analysis II. Basic concepts and techniques used in the deterministic modeling of systems. Elements of linear algebra; linear, integer, dynamic, and geometric programming; and unconstrained and constrained optimization. Prerequisite: four courses in college mathematics. One course. *Trivedi*

231. Introduction to Operating Systems. Basic concepts and principles of multiprogrammed operating systems. Memory, CPU, I/O device management and scheduling. Buffering techniques. Performance evaluation. Case studies of existing systems. Prerequisite: Computer Science 104. One course. *Kedem or Trivedi*

232. Compiler Construction. Models and techniques used in the design and implementation of assemblers, interpreters, and compilers. Lexical analysis, compilation of arithmetic expressions and simple statements, specifications of syntax, algorithms for syntactic analysis, code generation and optimization techniques. One course. *Wagner*

241. Data Base Methodology. Basic concepts and principles. Relational, hierarchical, and network approaches to data organization; data entry and query language support for data base systems; theories of data organization; security and privacy issues. Prerequisites: Computer Science 104 and either 155 or equivalent. C-L: Mechanical Engineering 242. One course. *Starmer*

245. Functional Analysis for Scientific Computing. Linear spaces, topologies, norms, and completeness. Focus on Banach and Hilbert spaces including Sobolev spaces. Linear and nonlinear operators. Fréchet derivatives. Iterative methods for nonlinear operator systems, such as Newton-like methods. Applications. Intended for science and engineering students but not mathematics graduate students. Prerequisite: Computer Science 221. C-L: Mathematics 245. One course. *Rose or Szyl*

252. Computer Systems Organization. Hardware and software aspects. Processor, memory, device, and communication subsystems; case studies of hardware system organization, e.g., parallel, associative, fault-tolerant; organization of software systems to exploit hardware systems organization; economic and reliability aspects of various hardware organizations. Prerequisites: Computer Science 104 and 157. C-L: Electrical Engineering 252. One course. *Trivedi*

265. Advanced Topics in Computer Science. One course. *Staff*

276. Communication, Computation, and Memory in Biological Systems. Communication and memory in biological systems: voltage sensitive ion channels, hormone-receptor interactions, and initiation and control of RNA/DNA synthesis. Models of signaling and memory are developed and related to electronic signaling schemes. Prerequisites: Computer Science 102, two semesters of college chemistry, and four semesters of college mathematics. One course. *Starmer*

THE MAJOR

For the B.A. Degree

Prerequisites. Computer Science 51; Mathematics 33 (or 31), 34 (or 32), 105 (or 103), 106 (or 104).

Major Requirements. Computer Science 102, 104, 106, 121, and 131; one elective course at the 100 level or above in Computer Science, Electrical Engineering, or Mathematics; and Mathematics 135 or Statistics 200. If Mathematics 135 is elected, it is strongly recommended that it be followed by Mathematics 136. Students must complete at least five addi-

tional courses at the 100 level or above (excluding Mathematics 103, 104, 105, and 106) in one department other than computer science or in an approved area. A list of areas which have been approved by the department, such as the zoology-chemistry combination often chosen by premedical students, may be obtained from the Director of Undergraduate Studies.

For the B.S. Degree

Prerequisites. Chemistry 11; Mathematics 33 (or 31), 34 (or 32), 105 (or 103), 106 (or 104); Physics 51 and 52.

Major Requirements. Computer Science 53, 103, 104, 106, 121, 125, and 131; two elective courses at the 100 level or above in computer science, electrical engineering, or mathematics; Electrical Engineering 157; Mathematics 135 or Statistics 200; and Mathematics 124 or 187. If Mathematics 135 is selected, it is recommended that Mathematics 136 be taken also.

Honors

Students who are qualified (see the section on honors in this bulletin) may undertake work leading to a B.A. or B.S. degree with distinction in computer science by applying to the Director of Undergraduate Studies. Normally, candidates must have grades of A in computer science courses. They must complete a substantial project, suitably documented, or a distinguished paper on which they will be examined orally by a committee of three faculty members.

Dance

For courses in dance, see Institute of the Arts.

Distinguished Professor Courses (DPC)

Distinguished Professor Courses enable students, regardless of their majors, to study with some of the most outstanding teachers and scholars within the University. The courses ordinarily focus on topics of broad intellectual and academic interest beyond the scope of a single discipline. They may count toward the distributional requirements, and if so, the division of each is indicated at the end of the description or by the division of a cross-listed course.

194. Bach: Master of Style. An approach to the "deepest thinking," the "most desirous of learning" of all the great composers. Works showing his unique ability to assimilate styles: including the *Brandenburg Concertos*, the *Passions*, and the *B minor Mass*. The complete *Well-tempered Clavier* is studied by the class and performed on the harpsichord by instructor. Humanities. Prerequisite: ability to read music. C-L: Music 171. One course. *Williams*

195S. Geometry and Physics. Relativity and general field theory from the point of view of differential geometry, to provide background for the modern gauge-field theories, including Yang-Mills theory, now prominent in mathematical physics. Natural Sciences. Prerequisites: advanced calculus and general physics, including electricity and magnetism. One course. *Griffiths*

196S. Current Political Problems in Western European and Commonwealth Countries. Social Sciences. Prerequisite: consent of instructor. C-L: Comparative Area Studies. One course. *Cole*

197S. Education through Nonsense. Lewis Carroll and his major works with readings from the books that he alluded to or parodied. Focus especially on his logical, mathematical, social, and literary puzzles. Humanities. Prerequisite: consent of instructor. One course. *Herington*

199S. The Changing Biosphere: Past, Present, and Future. Interactions between changing global environments through time. The maintenance, evolution, and extinction of biotic systems, including communities. Special emphasis on the nineteenth, twentieth, and twenty-first centuries. Natural Sciences. Prerequisite: consent of instructor. C-L: Botany 199S. One course. *Billings*

201. Dante's *Inferno*. A close study of the text in a bilingual edition. Attention to the historical, political, and theological aspects of the poem. Examples of use of some of the cantos by Joyce, Eliot, and Beckett. Humanities. One course. *Fowlie*

202S. What It Means to Be Human. What natural and humanistic sciences, and also philosophy and theology, have to say about the distinctive character of human beings. Humanities. Prerequisite: junior or senior standing. One course. *Langford*

203. Proust, *Remembrance of Things Past*. In the three-volume translation by Kilmartin. The aesthetics of the novel in terms of its structure, characters, and social classes of France. Students who know French will be encouraged to do some of the reading in French. Humanities. One course. *Fowlie*

204S. Health Care Law and Policy. How law shapes the performance of the health care industry. The tensions between quality and cost, professionalism and commercialism, and regulation and competition. Social Sciences. Prerequisite: senior standing. One course. *Havighurst*

205. The French Symbolists and T. S. Eliot. A study of the poems and theory of Baudelaire, Mallarmé, and Rimbaud. The debt of the symbolists to Poe and their influence on Eliot. Taught in English. Bilingual texts will be used. Humanities. One course. *Fowlie*

Drama Program (DRA)

Faculty of the Program: Artist-in-Residence Ball, *Director of the Drama Program and Undergraduate Studies*; Professors of the Practice of Theater Clum and Hobbs; Artists-in-Residence Fitzmorris, Herman, and Judd; Adjunct Professor Azenberg; Instructors Kumin and O'Dor; Lecturer Banner. Affiliated faculty: Professors Jackson (English), A. Patterson (English), Randall (English), Stewart (Romance languages), Torgovnick (English), and G. Williams (English); Associate Professors Alt (Germanic languages), Burian (classical studies), DeNeef (English), and Jones (English); Assistant Professors Gaines (English), Gopen (English), and Moses (English); Research Assistant Professor Porter (English); Lecturer Hill (English)

A major is available in this program.

The Drama Program applies two approaches: the artistic/creative, and the scholarly/theoretical. Through both approaches, the program either can provide a component of a liberal arts education, or, via intensive in-depth studio instruction, it can prepare highly-motivated, passionately interested students to pursue professional theater or screen activities. Classwork is primary, but complemented and extended by an array of student production activities and participation in professional stage and screen projects. The professional backgrounds and expertise of the resident faculty are augmented by those of a guest faculty of wide-ranging experience, from Broadway to Hollywood, from regional theater to television. The program's emphasis is on understanding and experiencing theater and screen as participatory, group art forms shaped by social, economic, technological, artistic, personal, and intellectual forces. The program—whether for the moderately interested student or the fervent, dedicated preprofessional—stresses the continual interdependence of these forces.

INTRODUCTORY COURSES

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

51. Introduction to World Theater. Relationship of the history, arts, and crafts of theater to dramatic content and society. Primitive origins to Renaissance. One course. *Clum*

55. Text Analysis. Examining the script for theater applications. Half course. *Ball*

64. Drama of Greece and Rome. See C-L: Classical Studies 64. One course. *Burian*

65. Introduction to Film. See C-L: English 81; also C-L: Film and Video. One course. *Gaines*

71. Stagecraft. Fundamentals of scenic technology: theater space, tools and hardware, lighting equipment, and reading of plans. Laboratory. One course. *Fitzmorris*

81. Essentials of Public Speaking. Basics of and practice in oral presentations, with particular attention to the gathering and organization of speech materials. For freshmen and sophomores. C-L: English 71. One course. *O'Dor or Hill*

82. Essentials of Public Speaking. Similar to Drama 81, but for juniors and seniors. Not open to students who have taken Drama 81 or English 71. C-L: English 72. One course. *O'Dor or Hill*

83S. Argumentation. Analysis, investigation, evidence, reasoning and refutation, and other communication strategies. Prerequisite: consent of instructor. C-L: English 73S. One course. *O'Dor*

99. Introduction to Acting. The development of creativity by exploring the use of the imagination through improvisation and theater games. For non-majors and beginning majors. Not open to students who have taken Drama 101. One course. *Staff*

OTHER UNDERGRADUATE COURSES

101. Acting: Theory and Practice I. Fundamental concepts and performance skills; beginning scene study. (Drama 71 may be taken concurrently with Drama 101.) Prerequisites: Drama 71 and consent of instructor. One course. *Hobbs*

102. Acting: Theory and Practice II. Continuing scene study, emphasizing analysis and character. (Drama 55 may be taken concurrently with Drama 102.) Prerequisites: Drama 55, Drama 101, and consent of instructor. One course. *Hobbs*

103. Acting: Theory and Practice III. Advanced scene study. Elements of style. Prerequisites: Drama 102 and consent of instructor. One course. *Hobbs*

104. Acting: Theory and Practice IV. Continuing advanced scene study and style. Audition preparation. Prerequisites: Drama 103 and consent of instructor. One course. *Hobbs*

105. Voice and Speech. Vocal production and articulation. Phonetics, control, emotional response, projection, placement, and awareness of regionalisms. Prerequisite: Drama 101. One course. *Staff*

107. Movement. Applied body mechanics, tension release, breath, energy flow, relaxation, emotional response, alignment, and physical articulation. One course. *Staff*

111S. Playwriting I. Fundamentals of writing for stage and screen. Prerequisites: Drama 55, any other practical theater course (for example, acting, directing, design, stagecraft), and consent of instructor. C-L: English 107S and Film and Video. One course. *Ball*

112S. Playwriting II. Advanced projects in writing for production. Prerequisites: Drama 111S, and 101 or 181S, and consent of instructor. C-L: English 108S and Film and Video. One course. *Ball*

- 115, 116. Shakespeare.** See C-L: English 143, 144; also C-L: Medieval and Renaissance Studies. One course each. *DeNeef, Gopen, Jackson, Jones, A. Patterson, Porter, Randall, or G. Williams*
- 120. Twentieth-Century American Drama.** See C-L: English 162. One course. *Clum*
- 121. Modern British Drama.** See C-L: English 133. One course. *Clum or Moses*
- 122. French Comedy.** See C-L: French 151. One course. *Stewart*
- 123. French Drama of the Twentieth Century.** See C-L: French 162. One course. *Staff*
- 124S. Drama (German).** See C-L: German 115S. One course. *Alt*
- 125. Introduction to the World of Chekhov.** See C-L: Russian 177; also C-L: Comparative Area Studies. One course. *Staff*
- 126. French Drama of the Seventeenth Century.** See C-L: French 148; also C-L: Medieval and Renaissance Studies. One course. *Staff*
- 127S. Russian and Polish Drama of the Nineteenth and Early Twentieth Centuries.** See C-L: Russian 106S. One course. *Staff*
- 131S. Film and Video Theory and Practice.** Prerequisite: Comparative Literature 177, Drama 65, or English 81. See C-L: English 183S; also C-L: Institute of the Arts 115S. One course. *Staff*
- 135. Narrative Film and the Novel.** See C-L: English 188; also C-L: Film and Video. One course. *Clum, Gaines, Moses, or Torgovnick*
- 136. Studies in Film History.** See C-L: English 185; also C-L: Comparative Literature 187 and Film and Video. One course. *Clum, Gaines, or Moses*
- 137. Melodrama and Soap Opera.** See C-L: English 187. One course. *Clum or Gaines*
- 138. American Film Genres.** See C-L: English 182; also C-L: Film and Video. One course. *Clum, Gaines, or Moses*
- 139. Television, Technology, and Culture.** Prerequisite: Drama 65, Comparative Literature 177, or English 81. See C-L: English 190. One course. *Gaines*
- 141. Production and Internship.** Practical involvement in four different areas of Drama Program productions, attendance at Drama Program symposia, and completion of an approved internship or Duke Summer Drama Institute. Course requirements may be satisfied in any year, but only seniors register. Offered only on the pass/fail basis. No credit. *Staff*
- 147S. Southern Playwrights.** The work of Southern playwrights in the context of Southern literature, environment, culture, and language; how these considerations affect the creation of work for the stage; traditional and contemporary works. One course. *Banner*
- 148. Text and Performance.** (London summer program.) See C-L: English 181. One course. *Clum*
- 149. Drama and Society.** (London summer program.) See C-L: English 134. One course. *Clum*
- 151. World Theater: Advanced.** Intensive investigation of the history, arts, and crafts of theater and their relationship to dramatic content and theory and to society. Renaissance to present. One course. *Clum*

161. Stage Costuming. Survey of skills and techniques of design and construction. History, textiles, crafts, millinery, and aesthetics. Laboratory. One course. *Herman*

162. Costume Design I. Design principles applied to visualizing character and relationships. Periods and styles. One course. *Herman*

163. Costume Design II. Advanced applications. Prerequisite: Drama 162. One course. *Herman*

164. Advanced Costume Construction. Pattern draping, finishing, dyeing. Laboratory. Prerequisite: Drama 161 or consent of instructor. One course. *Herman*

165. Costume and Scene Design Rendering. Drawing and painting fundamentals for readable renderings. One course. *Herman or Judd*

166. Costume History. Relationship of clothing to culture and society from ancient Egypt to the present. One course. *Herman*

167. Make-Up: Theory and Practice. Design and execution. Methods, materials, special problems, and projects. Laboratory. Half course. *Herman*

168. Drawing and Rendering. Fundamentals of representational drawing using eye training methods. One course. *Herman*

170. Design and Color. Applications of theory to scenery, costumes, and lighting; emphasis on graphic presentation. Laboratory. Prerequisites: Drama 71 and one of the following—Drama 168, Art 53, or consent of instructor. One course. *Herman and Judd*

171. Advanced Stagecraft. Advanced methods and tools of scenic technology; emphasis on drafting, construction, and contemporary materials. Laboratory. Prerequisite: Drama 71. One course. *Fitzmorris*

172. Scenery Design I. Application of aesthetics, skills, and theory to scenic design; emphasis on design projects. Laboratory. Prerequisite: Drama 170 or consent of instructor based on portfolio review. One course. *Judd*

173. Scenery Design II. Advanced applications. Prerequisite: Drama 172. One course. *Judd and staff*

177. Lighting: Theory and Practice. History, fundamentals of electricity, instrumentation, and drafting light plots. Laboratory. Prerequisite: Drama 71 or consent of instructor. One course. *Judd*

178. Lighting Design. Advanced application of aesthetics and technique to lighting design, emphasizing design projects. Laboratory. Prerequisites: Drama 170, Drama 177, and Drama 168 or Art 53 or consent of instructor. One course. *Judd*

181S. Directing: Theory and Practice I. History, aesthetics, and fundamental techniques of directing. (Drama 51 may be taken concurrently with Drama 181S.) Prerequisites: Drama 51, 99 or 101, and consent of instructor. One course. *Staff*

182S. Directing: Theory and Practice II. Advanced application of aesthetics, skills, and theory to performance projects. Prerequisite: Drama 181S. One course. *Staff*

185. Theater Administration and Stage Management. History and principles of running the theater and managing the production. Emphasis on theater organization, theater types (commercial, not-for-profit, regional), and involvement with other entities (unions, investors, philanthropic bodies). One course. *Kumin and staff*

191, 192, 193, 194. Independent Study. Individual intensive research or creative projects. Half or one course. Prerequisite: consent of instructor. Variable credit. *Staff*

195, 196. Special Topics. Illustrative examples: specific writers or other theater artists, media studies, styles, mime, masks, clowns, stage fighting, newspaper criticism, studies of the profession, audition techniques, and theater periods. May be taken more than once. Half course, one course, respectively. *Staff*

195S, 196S. Special Topics. Seminar versions of Drama 195 and 196. May be taken more than once. Half course, one course, respectively. *Staff*

197S. Special Topics in Film. See C-L: English 189S; also C-L: Film and Video. One course. *Clum, Gaines, or Moses*

200S. Senior Forum. Topics include: current theater issues; portfolios and audition; future educational and career options; other areas for the advanced theater student. Prerequisite: senior drama major standing or consent of instructor. Half course. *Ball and Hobbs*

220S. Drama (German). See C-L: German 209S. One course. *Alt*

THE MAJOR

Majoring in Drama is a means of (1) acquiring a comprehensive knowledge of the field, (2) learning the skills, discipline, and dedication inseparable from theater and screen pursuits, and (3) becoming aware of the relationship of every field of knowledge to stage and screen activities. Drama majors are expected to demonstrate continual visible growth in each of these areas, and this most especially requires the development of professional attitudes, behavior, and responsibility. Thus, deep intellectual involvement and extraordinary passion are crucial prerequisites.

(1) **Theater Sequence** (for students interested primarily in live theater).

Prerequisites: Drama 51, 55, and 71.

Requirements: Drama 101, 141, 151, 161 or 172, 181S, 185, 200S, and two approved dramatic literature courses.

(2) **Theater and Screen Sequence** (for students interested in both live theater and film and video).

Prerequisites: Drama 51 (or 151), 55, 65, and 71.

Requirements. Drama 101, 131, 141, 181S, 200 plus two courses in Drama 195, 196 (Special Topics: for example, screen acting, directing, writing, producing, design) plus two approved courses in film or video history, criticism, or analysis.

Advanced Studies: Students intending to pursue graduate or professional theater or screen work may choose to take best advantage of the program's offerings via an advanced sequence of five approved Drama Program and related courses.

Note: The Drama Program's screen studies are distinct from those of the Film and Video Program. Screen studies in the Drama Program emphasize creative application and production, with an academic component. The Film and Video Program emphasizes history, theory, and criticism, with a production component. Students may pursue both. See listing under Film and Video Program.

Economics (ECO)

Professor Vernon, *Chairman*; Professor Grabowski, *Director of Undergraduate Studies*; Professors Clotfelter, Cook, Davies, de Marchi, Geweke, Gillis, Goodwin, Graham, Havrilesky, Kelley, Kreps, Krueger, McElroy, Naylor, Tower, Trembl, Wallace, Weintraub, and Yohe; Associate Professors Kimbrough and Tauchen; Assistant Professors Baumgardner, Brock, Marshall, Meurer, Shetty, Stahl, and Zarkin; Adjunct Professors Bates, Gallant, Ladd, and Richard; Research Professors Coats, Henderson, and Hendry

A major is available in this department.

Economics courses develop the critical and analytical skills essential for understanding economic problems and institutions, in both their contemporary and historical set-

tings. Although no particular vocational or professional goal is emphasized, these courses provide the academic background necessary for positions in industry, for work in many branches of government service, for law school, and for graduate study in business administration, economics, and the social sciences.

Students planning to do graduate work in economics are advised to take as many of the following courses in mathematics (listed in preferential order) as their schedules permit: Mathematics 31, 32, 103, 104, 131, 135, and 136.

1. National Income and Public Policy. Basic economic analysis emphasizing current public policy issues. Means of determining the level and rate of growth of aggregate national income and output. Causes of unemployment, inflation, and international payment problems. The effects of monetary policy (money supply and interest rates) and fiscal policy (government expenditures and taxes) on these problems. Open only to freshmen. One course. *Staff*

1D, 2D. The same courses as Economics 1, 2 except taught as lectures with discussion sections. One course each. *Staff*

2. Competition, Monopoly, and Welfare. The composition of output and the distribution of income in a market economy. Role of government. Contemporary problems of the environment. Topics such as environmental economics, monopoly, unionism, international trade. Comparison of a market economy with other systems of economic organization. Economic problems of developing countries. Open only to freshmen. One course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

51. National Income and Public Policy. See Economics 1. Open to all students. One course. *Staff*

51D, 52D. The same courses as Economics 51, 52 except taught as lectures with discussion sections. One course each. *Staff*

52. Competition, Monopoly, and Welfare. See Economics 2. Open to all students. One course. *Staff*

53. Economics of Contemporary Issues. Modern economic problems, such as environmental deterioration and urban decay. The market as one of the interrelated subsystems of the social system, from institutionalist, Marxist, and other perspectives in the social sciences. One course. *Havrilesky*

108. Economics of War. Conflict theory, causes and economic consequences of war, military personnel, military-industrial complex, disarmament, and the economy. Prerequisite: Economics 52. One course. *Weintraub*

114. Social Choice. The economic study of nonmarket decision making. Theory of constitutions, voting rules, voter behavior, the bureaucracy, incentives for reaching consensus, and the evolution of cooperation. Applications to the provision of public goods, and tax policy and redistribution. Available only in the Duke in Amsterdam Summer Program. Prerequisites: Economics 1 or 51, 2 or 52. One course. *de Marchi*

132. Introduction to Economic History. A survey of Western economic history: population, production, exchange, and institutions; from antiquity to the present. Prerequisite: Economics 52 or consent of instructor. One course. *Staff*

133. The Evolution of the American Economy. The process of industrialization and modernization in the United States from the pre-Civil War period to the present. Prerequisites: Economics 51 and 52. One course. *Coats*

135. The Dutch Economy. Analysis of social and economic policymaking in the Netherlands. The recent history and theory of state intervention; the ideology, institutional context and machinery of social consensus in the areas of taxation, labor markets, incomes policy, industrial policy, energy, housing, education, health care, and national insurance. Available only in the Duke in Amsterdam Summer Program. One course. *de Marchi*

139. Introduction to Econometrics. Data collection, estimation, and hypothesis testing. Use of econometric models for analysis and policy. Prerequisites: Economics 2 or 52 and Mathematics 32 or equivalent and Statistics 10D or equivalent. One course. *McElroy, Marshall, Tauchen, or Wallace*

149. Microeconomic Theory. Cost and supply considerations in price theory; the demand for factors of production. The allocation of resources in the context of competitive and monopolistic market structures. Not open to students who have had Public Policy Studies 110. Prerequisites: Economics 2 or 52 and Mathematics 31. One course. *Graham, McElroy, Stahl, Treml, Vernon, Wallace, or Zarkin*

150. History of Economic Thought. Approaches to economic problems from Aristotle to Keynes, emphasizing certain models and doctrines—their origins, relevance, and evolution. Readings from Mun, Quesnay, Adam Smith, Malthus, Ricardo, Marx, Walras, Veblen, and Keynes. C-L: Comparative Area Studies. One course. *de Marchi or Goodwin*

153. Monetary Economics. The evolution and operations of commercial and central banking and nonbanking financial institutions in the United States, the determination of monetary aggregates and interest rates, the financial impacts of Treasury operations, and the linkages from Federal Reserve actions to price level, employment, economic growth, and balance of payments objectives. Prerequisite: Economics 154. One course. *Brock, Havrilesky, or Yohe*

154. Aggregate Economics. Concepts and measurement of national income and expenditures, employment, interest rates, and price levels; the theoretical determination of these aggregates; applications of macroeconomic theory to business cycles and economic growth. Prerequisites: Economics 1 or 51 and 2 or 52 and Mathematics 31. One course. *de Marchi, Havrilesky, Kimbrough, Stahl, Tauchen, Tower, or Yohe*

155. Labor Economics: Analysis and Measurement. Labor market equilibria. The demand for labor. The supply of labor: human fertility, human capital, hours of work, and labor force participation. Wage levels and differences. Union and government as labor market factors. Prerequisites: Economics 149, Mathematics 31, and statistics. One course. *Baumgardner or Zarkin*

157S. Business Cycles and Economic Forecasting. Causes of fluctuations in economic activity and conventional methods of forecasting micro- and macroeconomic variables, using microcomputer programs. Forecasting projects by students. Prerequisites: Economics 149, 154, and statistics. One course. *Yohe*

159S. State and Local Public Policy. Does not count for economics major requirements. Prerequisite: Economics 149, Public Policy 110, or consent of instructor. See C-L: Public Policy Studies 159S. One course. *Staff*

160. Resource Economics and Public Policy. Microeconomic analysis of nonrenewable resources. Resource scarcity and economic interpretations of doomsday models. Rationale for government intervention into natural resource markets and the effects of governmental policies on investments, rates of extraction, and conservation. Prerequisite: Economics 149. One course. *Staff*

184. An Introduction to Canada and Canadian Issues. Does not count for economics major requirements. See C-L: Interdisciplinary Course 184; also C-L: Canadian

Studies, Comparative Area Studies, History 184, Political Science 184, and Sociology 184. One course. *Cahow*

187. Public Finance. Economic aspects of such problems as the growth of government, the proper role of the state, the centralization and decentralization of government, government bureaucracy, the impact of taxes and spending on the wealthy and the poor, other public policies and questions. Prerequisite: Economics 149. One course. *Davies*

189. Business and Government. Public policies which most directly affect the operation of competition in the business world. The economic basis for an evaluation of antitrust policy, public utility regulation, and public enterprise. Prerequisites: Economics 149 and statistics, or consent of instructor. One course. *Grabowski or Vernon*

191, 192. Independent Study. Directed reading and research. Prerequisites: consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

193, 194. Independent Study. Same as Economics 191, 192, but for seniors. One course each. *Staff*

For Advanced Undergraduates and Graduates

200. Capitalism and Socialism. Selected ideological classics of new and old, right and left economics including both "counsels for perfection" (utopias) and "precepts for action" in political economy. Prerequisites: Economics 149 and 154 or consent of instructor. One course. *Naylor*

205S. Advanced Monetary Theory and Policy. Emphasis on recent issues: innovations in the payments mechanism and new monetary aggregates, the subterranean economy, financial crises, alternative views of the monetary policy transmission mechanism, and the monetarist-fiscalist controversy. Prerequisite: Economics 153. One course. *Havrilesky or Yohe*

212S. Economic Science and Economic Policy. A historical examination of the impact of economics on public policy; topics vary each semester and have included energy and anti-inflation policy, productivity growth, the Third World, and the Council of Economic Advisers. One course. *Goodwin*

214. Social Choice. A nonseminar version of 214S. Same as 114 but requires additional major research paper. Available only in the Duke in Amsterdam Summer Program. Prerequisites: Economics 1 or 51, 2 or 52. One course. *de Marchi*

214S. Social Choice. Same as 114, but requires additional major research paper. Prerequisites: Economics 149 and consent of instructor. One course. *de Marchi*

218. Macroeconomic Policy. Does not count for economics major requirements. See C-L: Public Policy Studies 218. One course. *Staff*

219S. Economic Problems of Underdeveloped Areas. Analysis of underdeveloped countries with some attention to national and international programs designed to accelerate development. Prerequisite: Economics 149 or consent of instructor. C-L: Comparative Area Studies. One course. *Kelley or Naylor*

232. Microeconomics: Policy Applications. Does not count for economics major requirements. See C-L: Public Policy Studies 232. One course. *Gillis*

233. Federal, State, and Local Finance and Economic Policies. Analysis of expenditures, taxation, debt, public enterprises, and current government programs. Prerequisite: Economics 149 or consent of instructor. One course. *Davies*

239. Introduction to Econometrics. Same as 139 but requires additional term paper. (Not open to students who have had Economics 139.) Prerequisites: Economics 2 or 52

and Mathematics 32 or equivalent and Statistics 10D or equivalent. One course. *Marshall, McElroy, Tauchen, or Wallace*

243. Econometrics I. Economic theory, mathematics, statistical inference, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. Prerequisites: Economics 149 and Statistics 200 or equivalents. C-L: Statistics 243. One course. *Marshall or Wallace*

244. Corporate Economics I. Strategic planning models of the firm including marginal analysis, mathematical programming, portfolio, and corporate simulation models. Economics as the language of corporate planning and modeling. Prerequisites: Economics 149 and statistics, or equivalents. One course. *Naylor*

245. Econometrics II. Advanced theory and applications: includes specification error, generalized least squares, lag structures, Bayesian decision making, simultaneous equation methods, and forecasting. Emphasis on current applied literature. Prerequisite: Economics 243. C-L: Statistics 245. One course. *Geweke, McElroy, Tauchen, or Wallace*

246. Selected Topics in Econometric Theory. Analysis of panel data, combining data from different sources, vector autoregressive methods, problems of causation in time series data, nonlinear estimation, limited dependent variables, sample selection bias, and other topics to be chosen subject to the interests of the class. C-L: Statistics 246. One course. *Geweke, Tauchen, or Wallace*

247S. Applied Econometrics. Application of current developments in econometric methodology to empirical problems in economics. Emphasis on the conduct of empirical research, including model and hypothesis formulation, testing, and integration of economic and econometric theory. C-L: Statistics 247S. One course. *Geweke, Marshall, McElroy, Tauchen, or Wallace*

249. Microeconomics. Similar to Economics 149 but at a more advanced level. Not open to students who have taken Economics 149. One course. *Staff*

250S. Modern Economic Thought. Major streams of economic analysis since 1936. Selected topics from the economics of Keynes, its offshoots and coordinate developments in monetary and equilibrium theory; post-Marxian economic theory. Historical evolution of recent ideas and their interrelations. Prerequisites: Economics 149, Economics 154, and statistics, or consent of instructor. One course. *de Marchi or Weintraub*

254. Macroeconomics. Similar to Economics 154 but at a more advanced level. Not open to students who have taken Economics 154. One course. *Staff*

265S. International Trade and Finance. Fundamental principles of international economic relations. The economic basis for international specialization and trade and the economic gains from trade, the balance of international payments, problems of international finance, investments, and monetary problems. Prerequisites: Economics 149 and 154. C-L: Canadian Studies. One course. *Brock, Kimbrough, or Tower*

270S. Fundamentals of Political Economy. See C-L: Political Science 270S. One course. *Aldrich, Bates, or Bianco*

287. Public Finance. Same as 187 but requires additional term paper. Not open to students who have had Economics 187. Prerequisite: Economics 149. One course. *Davies*

293. Soviet Economic History. Establishment of foundations of a socialist economy: collectivization, industrialization, and search for economic efficiency. C-L: Comparative Area Studies. One course. *Tremblay*

294S. Soviet Economic System. Economic planning and administration in the Soviet Union and other socialist countries. International comparisons. Theoretical and applied problems of resource allocation, economic development, and optimal micro decision making in a nonmarket economy. C-L: Comparative Area Studies. One course. *Trembl*

Honors Seminars (by invitation only)

201S, 202S. Current Issues in Economics. Economic analysis of such issues as the health care system, crime and punishment, pollution and the environment, the performing arts, welfare, and the energy crisis. Prerequisites: for 201S, Economics 149 and statistics; for 202S, Economics 201S. One course each. *Davies*

206S. Regulation and Industrial Economics. Analysis of industrial competition and performance in industries such as automobiles, steel, agriculture, airlines, pharmaceuticals, computers, and cable TV. Analysis of the efficiency of regulation and other public policy programs. Prerequisites: Economics 149 and statistics. One course. *Grabowski*

207S. Conflict and Cooperation in Economics. Elements of game theory. Cooperative and noncooperative games with reference to trading, general equilibrium theory, oligopoly, and monopoly. Prerequisites: Economics 149 and Mathematics 103. One course. *Weintraub*

208S. Economics of Labor Supply and the Family. Supply of labor and returns to human capital over the life cycle; demand for labor and discrimination; sex and race differences in wage rates, hours of work earnings, occupation, and unemployment; specialization, conflict and cooperation, and the allocation of goods and leisure within a family; marriage and divorce; and fertility. Prerequisites: Economics 149 and statistics; Economics 139 is recommended. C-L: Women's Studies. One course. *McElroy*

209S. Economics of Population. Relationship of population growth to economic development and to natural resource and environmental pressures. Causes and impacts of population change, including economic models of fertility, mortality, marriage, and migration. Prerequisites: Economics 149 and 154. One course. *Kelley*

213S. Economics of Slavery in the American South. The nature, development, and economic and social consequences of slavery in the United States during the nineteenth century. Prerequisites: Economics 149 and consent of instructor. C-L: Afro-American Studies 213S. One course. *Coats*

224S, 225S. Economics of the Law. Methods of economic analysis with applications to legal issues; elementary exposition of the mathematics of constrained optimization. Prerequisites: Economics 149 and statistics; for 225S, Economics 224S. One course each. *Graham*

COURSES CURRENTLY UNSCHEDULED

169, 170. Microeconomic Analysis I and II

198S. Economics of Regulation

203S. Mathematical Economics

204S. Advanced Monetary Economics

211S. Current Problems in Aggregate Supply

234. Urban and Regional Economics

235. The Economics of Crime

268. Federal Tax Policy

285. Evaluation of Public Expenditures

286S. Economic Policy Making in Developing Countries

THE MAJOR

For freshmen matriculating in the fall 1986 semester, and thereafter:

Prerequisites. Mathematics 31, Economics 1 or 51, and Economics 2 or 52, and an approved statistics course. (Statistics courses currently acceptable include Statistics 10 and 100 and Public Policy Studies 112.)

Major Requirements. Economics 149, 154, and any three additional 100- or 200-level courses. Substitution of similar courses in other departments for courses in the economics department will not be permitted.

For all students matriculating before the fall 1986 semester:

Prerequisites. Mathematics 31, Economics 1 or 51, and Economics 2 or 52.

Major Requirements. Economics 149, 154, and any three additional 100- or 200-level economics courses. Substitution of similar courses in other departments for courses in the economics department will not be permitted.

Honors. For graduation with distinction at least one honors seminar and an honors paper are required. Prerequisites for admission to an honors seminar are two of the following courses: Economics 149, 154, and an approved statistics course. See the section on honors in this bulletin.

Education Program (EDU)

Associate Professor Davis, *Chairman and Director of Undergraduate Studies*; Professor Page; Associate Professors Ballantyne, Carbone, Di Bona, Johnson, and Sawyer; Adjunct Professor Eilber; Adjunct Associate Professor Martin; Part-time Instructors Malone and Peete; Lecturer Fowler

Students who desire an understanding of the study of education as part of their liberal arts program should elect courses in accordance with their special interests. Selected courses in education may satisfy distribution requirements in the division of the social sciences. Students who expect to teach should confer with the Director of Undergraduate Studies or other advisers in the program prior to registration each semester. Students interested in certification to teach in secondary schools should consult with Professors Carbone or Davis.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

100. Social and Philosophical Foundations of Education. Basic features and assumptions, viewpoints, and issues of education in contemporary America. One course. *Carbone or Di Bona*

103S. American Educational Theory. A study of contemporary issues and problems. One course. *Carbone*

117S. Psychology of Personal and Social Adjustment. Principles of mental health affecting individual and social adjustments. One course. *Malone or staff*

118. Educational Psychology. Emotional and cognitive learning in children, youth, and adults. One course. *Ballantyne, Davis, or Page*

121. Infancy, Early Childhood, and Educational Programs. Developmental theories and their practical application in education. Emphasis on parenting and teaching. One course. *Staff*

139. Marxism and Society. Core course for the Program in Perspectives on Marxism and Society. See C-L: Anthropology 139; also C-L: History 186, Interdisciplinary Course 139, and Sociology 139. One course. *Fox or J. Wilson*

140. The Psychology of Work. Factors affecting career choice and change. One course. *Ballantyne*

149S. Exceptional Children. Etiology and assessment of major types of exceptionalities, including intellectual abilities, physical or emotional handicaps, and sensorially impaired. Family relationships and treatment programs. One course. *Davis*

155S. Tests and Measurements. Measuring abilities, achievement, and personality. Analysis, criticism, and construction of tests for admission, classroom, and society. One course. *Page*

189S. The Teaching of Composition, Grammar, and Literature in Secondary School. See C-L: English 118S. One course. *Page*

191, 192. Independent Study. Directed reading and research for juniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for seniors. Prerequisites: consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

For Seniors and Graduates

205, 206. Selected Topics. One course each. *Staff*

215S. Seminar in Secondary School Teaching. Principles, practices, and problems in secondary school instruction. One course. *Carbone or staff*

216. Secondary Education: Internship. Supervised internship in senior high schools, involving some full-time teaching. For student teachers only. Prerequisites: C average overall and in teaching field or fields. Two courses. *Carbone or staff*

225. Teaching of History and the Social Studies. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. One course. *Carbone or staff*

232. Learning and Living in Families. Role and function of the family as related to the development and behavior of its members, to gender identification, to parenting, and to interactions among family members. One course. *Ballantyne or Davis*

236. Teaching Developmental and Remedial Reading in the Secondary School. Principles, methods, and materials for the development of effective reading attitudes and skills in developmental and remedial programs. One course. *Staff*

242S. Group Interactions. Examination of theoretical issues and processes involved in the dynamics of, and learning in, small groups of children, adolescents, parents, other adults, with attention to problem-oriented groups. One course. *Ballantyne*

246. Teaching of Mathematics. Aims, curriculum, and classroom procedure for teaching secondary school mathematics. One course. *Staff*

276. The Teaching of High School Science. Discussion, lectures, and collateral reading related to such topics as aims, tests, curriculum, classroom and laboratory procedures, field trips, and course and lesson planning for secondary school science. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

168S. Contemporary Education Criticism

170. The Undergraduate Curriculum

171T, 172T. Junior-Senior Tutorials

173, 174. Clinical Reading Practicum

211. Education and the Mass Media

212S. Pedagogy and Political Economy: A World View

227. Contemporary Theories of Counseling and Psychotherapy

248. Practicum in Counseling

UNIVERSITY PROGRAM FOR PREPARATION FOR TEACHING*

Duke University offers programs to prepare students to meet certification requirements for teaching in secondary schools although no major is offered in education. Prerequisites for all prospective teachers are an introductory course in psychology and Education 100 or 103S or equivalent. Special materials and methods courses should be taken in the education program and other appropriate departments prior to undergraduate student teaching, which is part of a planned professional semester in the senior year. Only students with a C average or higher overall and in the major and teaching fields will be admitted to student teaching.

Secondary School Teaching

Prospective secondary school teachers must major in a subject other than education. They are advised to consult the appropriate adviser in education prior to each registration period to assure that they will be eligible to enter the required student teaching program. Students preparing to teach in a secondary school must meet certification requirements by qualifying in one teaching field. Qualifications for certification to teach a single science may be sought under either the Bachelor of Arts or the Bachelor of Science degree.

English (ENG)

Professor Fish, *Chairman*; Professor Torgovnick, *Assistant Chairman*; Associate Professor Butters, *Director of Undergraduate Studies*; Assistant Professor Gopen, *Supervisor of Freshman Instruction and Director of University Writing Program*; Professors Anderson, Budd, Ferguson, Gleckner, Jackson, Lentricchia, Nygard, A. Patterson, L. Patterson, Price, Randall, Ryals, B. H. Smith, G. Smith, Strandberg, Tompkins, G. Williams, and K. Williams; Associate Professors Applewhite, Clum, DeNeef, Gerber, Jones, Mellown, Pope, and Schwartz; Assistant Professors Gaines, Moon, and Moses; Research Assistant Professor Porter; Adjunct Associate Professor Ball; Adjunct Assistant Professors Tetel and Wittig; Lecturer Hill

A major is available in this department.

WRITING AND LANGUAGE

For courses in composition see below and also University Writing Courses 4, 5, 6, and 7 in the University Writing Program section of this bulletin.

3. Introductory Composition and Literature. A skills course in composition and literature (contemporary essays and short stories), with frequent writing assignments; regular individual conferences. (This course, offered in the Summer Transitional Program, does not satisfy the requirement for proficiency in writing.) One course. *Staff*

27S. Studies in Nonliterary Topics. May be taken twice. One course. *Staff*

28S. Introduction to Creative Writing. Prerequisite: consent of instructor. One course. *Staff*

29. This number represents credit for advanced placement on the basis of the College Board examination in composition and language. One course.

*Duke University is accredited by the North Carolina Department of Public Education and has reciprocal approval for initial certification with most of the fifty states.

61S. Writing: Prose Fiction and Drama. Prerequisite: consent of instructor. One course. *Staff*

62S. Writing: Poetry. Prerequisite: consent of instructor. One course. *Staff*

101S. Advanced Expository Writing. Techniques of effective writing. One course. *Staff*

103S, 104S. Writing: Short Stories. Class discussion of students' manuscripts; individual conferences with the instructor. Open to sophomores, juniors, and seniors. Prerequisite: consent of instructor. One course each. *Applewhite, Pope, Porter, or Price*

105S, 106S. The Writing of Poetry. Meter, image, tone, and dramatic organization in traditional and modern poems as a basis for original composition. Prerequisite: consent of instructor. One course each. *Applewhite or Pope*

107S. Playwriting I. Fundamentals of writing for stage and screen. Prerequisites: Drama 55, any other practical theater course (for example, acting, directing, design, stagecraft), and consent of instructor. C-L: Drama 111S and Film and Video. One course. *Ball*

108S. Playwriting II. Advanced projects in writing for production. Prerequisites: Drama 111S or English 107S, and Drama 101 or 181S, and consent of instructor. C-L: Drama 112S and Film and Video. One course. *Ball*

109S. Special Topics in Writing. Advanced work for majors who have taken at least two previous 100-level writing courses. Prerequisite: consent of instructor. One course. *Staff*

110S. Writing: Longer Prose Narrative. The writing of a novel, novella, or a group of short stories. Primarily for juniors and seniors. Prerequisite: consent of instructor. One course. *Porter or Price*

111. Introduction to Linguistics. See C-L: Anthropology 107; also C-L: Interdisciplinary Course 111 and Linguistics. One course. *Butters, Nygard, or Tetel*

112. English Historical Linguistics. Introduction to methods and principles of historical linguistics, as exemplified by the history of the English language from Proto-Indo-European to the present. C-L: Linguistics. One course. *Butters, Nygard, or Tetel*

115. Present-Day English. Origins, development, and current structure of English, especially in America. Transformational versus traditional and structural grammar, written versus spoken English, social and regional dialects. C-L: Linguistics. One course. *Butters, Nygard, or Tetel*

118S. The Teaching of Composition, Grammar, and Literature in Secondary School. Visits to secondary school English classes, discussion with successful teachers, practice in making presentations, and evaluation of written work and other performance. C-L: Education 189S. One course. *Page (education)*

119. Current Topics in Linguistics. May be repeated as topics vary. See C-L: Anthropology 112; also C-L: Interdisciplinary Course 119 and Linguistics. One course. *Staff*

For Juniors, Seniors, and Graduates

208. History of the English Language. Introductory survey of the changes in sounds, forms, and vocabulary of the English language from its beginning to the present, with emphasis on the evolution of the language as a medium of literary expression. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Butters, Nygard, or Tetel*

209. Present-Day English. A survey of contemporary linguistic theories applied to modern English; designed for students of literature and teachers of English. C-L: Linguistics. One course. *Butters or Nygard*

INTRODUCTION TO LITERATURE

20. This number represents credit for advanced placement on the basis of the College Board examination in literature and composition. One course.

21S. **Studies in the Novel.** One course. *Staff*

22S. **Studies in Drama.** One course. *Staff*

23S. **Studies in the Short Story.** One course. *Staff*

24S. **Studies in Poetry.** One course. *Staff*

25S. **Studies in the Epic.** One course. *Staff*

26S. **Studies in Special Topics.** May be taken twice. One course. *Staff*

49S. **Freshman Seminar.** Topics vary each semester offered. One course. *Staff*

51, 52. **Representative American Writers.** Selections and complete works. 51: Poe, Emerson or Thoreau, Hawthorne, Melville, Whitman, Dickinson, and Twain; not open to students who have taken English 152 or 153. 52: James, Frost or Robinson, Crane or Dreiser, O'Neill, Faulkner, Hemingway, and others. Not open to students who have taken English 153 or 154. One course each. *Staff*

91. **Introduction to the Study of English Literature.** Methods of literary analysis through the selected works of Chaucer, Shakespeare, Milton, and Pope. One course. *Staff*

92. **British Literature 1750-1950.** Studies in the literature of Great Britain from the eighteenth century through the modern period. One course. *Staff*

93. **Introduction to the Study of Literary Genre.** An introduction, through selected poetry, fiction, and drama, to the distinctive nature of each major genre and to the critical procedures for examining that genre. One course. *Staff*

93S. **Introduction to the Study of Literary Genre.** A seminar version of English 93. One course. *Wittig*

ENGLISH AND BRITISH LITERATURE

121. **Medieval English Literature to 1500.** The principal forms and examples of English prose, poetry, and drama of the Anglo-Saxon and Middle English periods (excluding Chaucer). In translation. C-L: Medieval and Renaissance Studies. One course. *Nygard or L. Patterson*

122. **Sixteenth-Century English Literature.** Emphasis in poetry on Wyatt, Sidney, Spenser, Raleigh, and Shakespeare; in prose on Sidney and Sir Thomas More; in drama on Marlowe. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Fish, or A. Patterson*

123. **English Literature: 1600 to 1660.** Emphasis in poetry on Jonson and the cavaliers, Donne and the metaphysicals; in drama on Jonson, Tourneur, Webster, and Ford; in prose on character writers, Bacon, Burton, Donne, and Browne. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Fish, A. Patterson, or Randall*

124. **English Literature: 1660 to 1800.** Major genres and authors such as Dryden, Congreve, Addison, Swift, Pope, Gray, Johnson, Blake, and Defoe or Fielding. One course. *Ferguson or Jackson*

125. **English Literature of the Romantic Period.** Wordsworth, Coleridge, Byron, Shelley, Keats. One course. *Applewhite, Gleckner, or Jackson*

126. **English Literature: 1832 to 1900.** Major writers and genres, with special emphasis

on Carlyle, Tennyson, Browning, Arnold, the pre-Raphaelites, and Hopkins. Collateral reading from novels. One course. *Ryals*

127, 128. Twentieth-Century British Literature. Emphasis on principal writers of fiction, drama, and poetry. 127: usually Conrad, Shaw, Yeats, Wells, Synge, Forster, Woolf, and Joyce. 128: usually Lawrence, Cary, Huxley, Auden, Greene, Beckett, and Dylan Thomas. One course each. *Mellown, Moses, Pope, or G. Smith*

131. Studies in a Single British Author. One course. *Staff*

132. Faith and Fiction in Victorian England. (Summer program in England.) Not open to students who have taken English 137. See C-L: Religion 186. One course. *Staff*

133. Modern British Drama. O'Casey, Coward, Eliot, Osborne, Pinter, Beckett, Stoppard, and others. C-L: Drama 121. One course. *Clum or Moses*

134. Drama and Society. Dramas of various ages and cultures in relation to the mores and values of the societies for which they were written. The ways in which contemporary drama and contemporary productions of earlier works reflect the concerns and values of society now. Readings of the texts and background work and viewing of sixteen London theatrical productions. (London summer program). C-L: Drama 149. One course. *Clum*

135. British Poetry of the Twentieth Century. Changes in poetry and its criticism from the Edwardians. Yeats, Housman, Lawrence, Owen, the Sitwells, Graves, Auden, MacNeice, Dylan Thomas, Hughes, and Larkin. One course. *Mellown, Moses, Pope, or G. Smith*

136. Eighteenth-Century British Novel. Defoe, Richardson, Fielding, Smollett, and Sterne; the Gothic novel. One course. *Ferguson or Jackson*

137. Nineteenth-Century British Novel. Scott, Austen, Dickens, Thackeray, Trollope, the Brontës, George Eliot, Meredith, Butler, Hardy, and others. Not open to students who have taken English 132. One course. *Moses or Ryals*

138. Twentieth-Century British Novel. Conrad, Lawrence, Forster, Joyce, Woolf, Huxley, Cary, Amis, and Golding. One course. *Mellown, Moses, Pope, or G. Smith*

139S. Special Topics in British Literature. One course. *Staff*

Major Authors

141. Chaucer. Focus on *The Canterbury Tales* and its literary and social background. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Nygard, or L. Patterson*

143, 144. Shakespeare. 143: twelve plays before 1600. 144: usually ten plays after 1600. C-L: Drama 115, 116 and Medieval and Renaissance Studies. One course each. *DeNeef, Gopen, Jackson, Jones, A. Patterson, Porter, Randall, or G. Williams*

145. Milton. Poetry and its literary and social background. C-L: Medieval and Renaissance Studies. One course. *Fish, A. Patterson, Price, or Schwartz*

For Juniors, Seniors, and Graduates

207. Old English Language and Literature. The pre-Conquest language and representative prose and poetry. One course. *Nygard*

212. Middle English Literature: 1100 to 1500. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Fish, Gopen, Nygard, or L. Patterson*

221. Renaissance Prose and Poetry: 1500 to 1660. Selected topics. C-L: Medieval and Renaissance Studies. One course. *DeNeef, Fish, A. Patterson, Randall, Schwartz, or G. Williams*

225. Renaissance Drama: 1500 to 1642. Selected topics. C-L: Medieval and Renaissance Studies. One course. *A. Patterson, Randall, or G. Williams*

235. Restoration and Eighteenth-Century Literature: 1660 to 1800. Selected topics. One course. *Ferguson or Jackson*

241. Romantic Literature: 1790 to 1830. Selected topics. One course. *Gleckner or Jackson*

245. Victorian Literature: 1830 to 1900. Selected topics. One course. *Ryals*

251. British Literature since 1900. Selected topics. One course. *Mellown, Moses, or G. Smith*

AMERICAN LITERATURE

151. American Literature to 1820. Colonial authors such as Bradford, Taylor, Cotton Mather, Edwards, Byrd, and Franklin, and authors of the early Republic such as Tyler, Freneau, and C. B. Brown. One course. *Jones, Moon, or Tompkins*

152. American Literature: 1820 to 1860. Prose and poetry of American romanticism: Emerson, Thoreau, Hawthorne, Poe, Melville, and Whitman. Not open to students who have taken English 51. One course. *Anderson, Gerber, Jones, Moon, Tompkins, or K. Williams*

153. American Literature: 1860 to 1915. Dickinson, Twain, James, the social and philosophical essayists, Crane, Dreiser, Robinson, and Frost. Not open to students who have taken English 52. One course. *Anderson, Budd, Gerber, Jones, Moon, or K. Williams*

154. American Literature: 1915 to 1960. Eliot, Fitzgerald, Hemingway, Faulkner, and others. Not open to students who have taken English 52. One course. *Clum, Lentricchia, Moon, Moses, Pope, or Strandberg*

155. Contemporary American Writers. Novelists and poets prominent since 1960. One course. *Clum, Moses, or Strandberg*

161. Studies in a Single American Author. One course. *Staff*

162. Twentieth-Century American Drama. Representative plays by O'Neill, Odets, Williams, Miller, Albee, Lanford Wilson, and others. C-L: Drama 120. One course. *Clum*

163. Twentieth-Century American Poetry. The classicism of Pound, Eliot, and the Fugitives in relation to the neoromanticism of Stevens, Williams, Crane, and Roethke. Developments during World War II and after: Lowell, Jarrell, Berryman, Dickey, Lever-
tov, and Wright. One course. *Applewhite, Moon, Moses, or Pope*

164, 165. American Fiction. A survey of the novel and the short story. 164: the nineteenth century; Poe, Hawthorne, Melville, Twain, James, and others. 165: the twentieth century; Hemingway, Faulkner, Fitzgerald, Barth, Pynchon, and others. One course each. *Clum, Moses, Strandberg, or K. Williams*

167, 168. Afro-American Literature. 167: oral and written literary traditions from the American colonial period into the nineteenth century, including the spiritual as lyric poetry and the slave narrative as autobiography. 168: the late nineteenth and the twentieth centuries, Paul Laurence Dunbar to Cyrus Colter. C-L: Afro-American Studies 173, 174. One course each. *K. Williams*

169S. Special Topics in American Literature. One course. *Staff*

For Juniors, Seniors, and Graduates

263. American Literature to 1865. Selected topics. One course. *Anderson, Jones, or Tompkins*

267. American Literature: 1865 to 1915. Selected topics. One course. *Budd, Tompkins, or K. Williams*

269. American Women Writers. Selected topics. C-L: Women's Studies. One course. *Pope or Tompkins*

275. American Literature since 1915. Selected topics. One course. *Lentricchia, Moses, Pope, or Strandberg*

GENRE AND WORLD LITERATURE

170. Theory of Genre. Introduction to literary genre and the critical questions raised about literature when examined from a generic perspective. One course. *DeNeef, Jackson, Moses, or Torgovnick*

171. Studies in a Genre. One course. *Staff*

173. Legend and Literature. Classical, Celtic, and/or Germanic legends and their places in later literature. Special attention to monsters in literature and to Arthurian material. One course. *L. Patterson or Torgovnick*

175. Literary Approaches to the Bible. Selected books of both Testaments, emphasizing narrative strategies, literary contexts, and Biblical genres: primeval myth, patriarchal history, prophecy, and apocalyptic. One course. *Schwartz*

176. Introduction to Folklore. A survey of the materials of oral tradition (folktale, legend, myth, and related forms) and the methods of investigation in the field. One course. *Nygard*

177. Ballad and Folksong. Orally transmitted song traditions, British and American. One course. *Nygard*

178. Literature and the Other Arts. Selected topics in the study of the interrelation of literature and other art forms, such as music and painting. One course. *Staff*

179S. Special Topics in a Literary Genre. One course. *Staff*

180. Writings in the Rural Tradition: From the Caribbean to the American South. See C-L: Comparative Literature 180. One course. *Willis*

181. Text and Performance. The relationship between the written dramatic text and theatrical performance of plays representing different periods, styles, and national origins. The twelve plays chosen from offerings in London, Stratford-on-Avon, and regional festivals. Papers in addition to classroom analysis of texts and productions. (London summer program.) C-L: Drama 148. One course. *Clum*

186. Canadian Literature in English. Eighteenth century to the present. Emphasis on the twentieth century and on novels by Hugh MacLennan, Margaret Laurence, Mordecai Richler, Margaret Atwood, Rudy Wiebe, and others. C-L: Canadian Studies and Comparative Area Studies. One course. *Staff*

CRITICISM

For Juniors, Seniors, and Graduates

281. Studies in Genre. History, criticism, and theory of literary genres such as the novel, pastoral, epic, and drama. One course. *Staff*

283S. Feminist Theory and the Humanities. See C-L: Interdisciplinary Course 283S; also C-L: Religion 269S and Women's Studies. One course. *Clark, Orr, Pope, or Tompkins*

285. Major Texts in the History of Literary Criticism. A survey of major critical writings from Aristotle to the present. One course. *Staff*

288. Special Topics. Subjects, areas, or themes that cut across historical eras, several national literatures, or genres. One course. *Staff*

289. The Theory of the Novel. Major issues in the history and theory of the novel. One course. *Moses or Torgovnick*

CULTURAL STUDIES

81. Introduction to Film. Basic film theory and history of motion picture technology. Introduction to experimental, documentary, and narrative forms of Third World, European, and United States cinemas. Economics and aesthetics. C-L: Drama 65 and Film and Video. One course. *Gaines*

82. Introduction to Media Studies. Film, photography, television, and other popular forms. Interdisciplinary perspectives on television news and serial form, pulp fiction and popular music, documentary film and photography, national cinemas and international advertising, avant-garde performance and theatrical acting, communications policy and legal theory. C-L: Comparative Literature 102 and Film and Video. One course. *Gaines and staff*

120. Advertising and Society. See C-L: Anthropology 110; also C-L: Sociology 160 and Women's Studies. One course. *O'Barr (anthropology), J. Smith (sociology), or Wilson (sociology)*

156. American Popular Culture. The formation of American popular culture in different historical periods. Cultural forms including music, movies, fashion, and leisure. C-L: Comparative Literature 156. One course. *Willis*

157, 158. American Literature and Culture. Relationship of literature to the other arts, American intellectual history, religion, science, technology, and architecture. 157: to the Civil War. 158: from the Civil War to 1960. One course each. *K. Williams*

182. American Film Genres. Introduction to study of popular film and television as narrative form and industrial product. Overview of the musical, comedy, western, and gangster genre. Analysis of film stars, history of film technology, and study of audience. C-L: Drama 138 and Film and Video. One course. *Clum, Gaines, or Moses*

183S. Film and Video Theory and Practice. Film and video production in conjunction with comparative history and theory of these technologies. Students produce works in basic Super 8 mm, 16 mm, and small format video production. Prerequisite: Comparative Literature 177, Drama 65, or English 81. C-L: Institute of the Arts 115S, Drama 131S, and Film and Video. One course. *Staff*

185. Studies in Film History. Close examination of a particular issue, period, national cinema, or technological development. C-L: Comparative Literature 187, Drama 136, and Film and Video. One course. *Clum, Gaines, or Moses*

187. Melodrama and Soap Opera. History of melodrama from Victorian theatrical production to television soap opera. Close study of popular women's fiction, silent cinema, the thirties and forties woman's picture, and fifties technicolor melodrama. C-L: Drama 137 and Film and Video. One course. *Clum or Gaines*

188. Narrative Film and the Novel. Continuities in the nineteenth-century realist novel, literary naturalism, and classical narrative cinema. Nonnarrative experimental forms, pulp fiction, and television specialization. C-L: Drama 135, Film and Video, and Women's Studies. One course. *Clum, Gaines, Moses, or Torgovnick*

189S. Special Topics in Film. A major genre, period, or director. Prerequisite: Drama 65 or English 81. C-L: Drama 197S and Film and Video. One course. *Clum, Gaines, or Moses*

190. Television, Technology, and Culture. Television criticism and its relation to film theory. Mainstream television genres, the historical avant-garde, and video art. History

of the technology and cross-cultural comparison of television programming. Prerequisite: Drama 65, English 81, or Comparative Literature 177. C-L: Drama 139. One course. *Gaines*

INDEPENDENT STUDY

191, 192, 193, 194. Independent Study. Directed reading and research. Students should consult the Director of Undergraduate Studies as early as possible in the preceding term. One course each. *Staff*

195T. Tutorial. Directed reading and research. Students should consult the Director of Undergraduate Studies as early as possible in the preceding term. One course. *Staff*

197S, 198S. Honors Program Sequence. See *Honors* under THE MAJOR. One course each. *Staff*

RELATED TOPICS

71. Essentials of Public Speaking. See C-L: Drama 81. One course. *Hill or O'Dor*

72. Essentials of Public Speaking. Not open to students who have taken English 71 or Drama 81. See C-L: Drama 82. One course. *Hill or O'Dor*

73S. Argumentation. Prerequisite: consent of instructor. See C-L: Drama 83S. One course. *O'Dor*

COURSES CURRENTLY UNSCHEDULED

12. Intermediate Composition

THE MAJOR

Basic Requirements. One course from the following list of introductory courses: English 51, 52, 61S, 62S, 81, 91, 92, 93, 93S. Except by written permission of the Director of Undergraduate Studies, the course must be taken in the first term after the major has been declared (unless it has been taken earlier). It may be taken concurrently with advanced courses.

Major Requirements. Eight or more courses at the 100- or 200-level, which are to be organized into a coherent *plan of study* approved by the student's advisor. One of the courses must be a 100-level seminar; one of the courses must be in a major author—Chaucer (English 141), Shakespeare (English 143 or 144), or Milton (English 145).

No later than the second semester of the student's junior year, the student must file a *plan of study* (approved by the student's advisor) with the Director of Undergraduate Studies in English. Typical nine-course *plans of study* include (but are not limited to) four or five courses in such *core* areas as Afro-American literature, American literature, British literature, contemporary writers, creative writing, cultural studies, drama, linguistics, literary theory, the novel, poetry, women writers. Majors are encouraged to take a broad range of department courses; students thus should select their electives with variety as an important criterion. The plan of study may be altered at any time with the consent of the advisor or the Director of Undergraduate Studies.

Foreign Languages. The department recommends that students majoring in English complete at least two years of college-level study, or the equivalent, of a foreign language. Students contemplating graduate work in English should note that many master's programs require examination in one foreign language and that doctoral programs commonly require examination in two. Students interested in linguistics are strongly urged to study at least one non-Indo-European language.

Teacher Certification. Each year a number of Duke English majors earn certificates as secondary school teachers. While licensed by the state of North Carolina, such majors are essentially certified for other states as well. Also, such training is urged for those who

consider private-school teaching, since most private or parochial schools, other things equal, would prefer the experienced and trained candidate.

Such licensing may be gained as part of the English major and is not as time consuming as sometimes believed. Candidates should select a major plan of study in American literature and choose Shakespeare as their major author, as these emphases correspond to the material of most secondary English programs. Also required are certain other English courses, and two courses in education. Especially, the last semester of the senior year is devoted to the Student Teaching Block, including two special, accelerated courses and eight weeks of full-time teaching and observation in the schools, working with a selected teacher and with Duke faculty. This experience leads to an English-teaching certificate to accompany the bachelor's degree.

Anyone considering English teaching should confer with the Program in Education as soon as possible, to help plan out the program.

Honors. For English majors in their senior year, the department offers an honors program consisting of a two-semester sequence—English 197S and 198S. These honors seminars raise questions about literary interpretation, introduce students to the principles of sustained research, and provide a forum in which to discuss the writing of the honors thesis. To earn honors, students in the program must present a long thesis—or its equivalent in imaginative writing—by the end of the second semester. The department's Honors Committee will evaluate the theses and award honors according to University guidelines. Course credit for individual semesters (but not honors) will be given if the work satisfies the course requirement but falls short of the honors standard. Students who want to enter the program must apply to the department's Honors Committee by February 1 of their junior year. Applicants must have a B+ average in English courses; previous grades, recommendations by teachers, a sample of the students' writing, and the students' own statements of purpose in their applications will determine admission.

Film and Video Program

Assistant Professor Gaines, *Director*

A certificate, but not a major, is available in this program.

The Program in Film and Video is an interdisciplinary course of study which introduces students to the critical analysis of communications technologies: film, photography, and television. Practical production experience is also available through course work and internships. Courses in this area are offered through twelve different academic departments and programs and taught by twenty faculty members. The program also sponsors speakers, film and television screenings, and exhibits in cooperation with the Center for Documentary Photography, the Institute of the Arts, and the Center for International Studies.

Students working toward a certificate in film and video declare a major in an academic department. To qualify for the certificate, students take five courses from the approved list published in this bulletin. One of these courses must be an introductory course selected from those listed below. Program courses are described under the listings of the various departments.

Note: The course of study in the Film and Video Program is distinct from that of the Drama Program. The Film and Video Program emphasizes history, theory, and criticism with a production component. The Drama Program emphasizes creative application and production with an academic component. Students may pursue both. See the listings under Drama Program.

Introductory Courses

English 81. Introduction to Film. C-L: Drama 65. *Gaines*

English 82. Introduction to Media Studies. C-L: Comparative Literature 102. *Gaines and staff*

English 182. American Film Genres. C-L: Drama 138. *Clum, Gaines, or Moses*

Anthropology 110. Advertising and Society. C-L: English 120, Sociology 160, and Women's Studies. *O'Barr*

Anthropology

118S. The Language of Advertising. C-L: Linguistics. *O'Barr*

Comparative Literature

177. Film Theory. C-L: Women's Studies. *Gaines*

185. Psychoanalysis, Literature, and Film. C-L: Women's Studies. *Gaines*

291. Topics in Popular Culture and the Media. *Staff*

Drama

111S, 112S. Playwriting I, II. *Ball*

English

156. American Popular Culture. C-L: Comparative Literature 156. *Willis*

183S. Film and Video Theory and Practice. C-L: Drama 131S and Institute of the Arts 115S. *Staff*

185. Studies in Film History. C-L: Comparative Literature 187 and Drama 136. *Clum, Gaines, or Moses*

187. Melodrama and Soap Opera. C-L: Drama 137. *Clum or Gaines*

188. Narrative Film and the Novel. *Clum, Gaines, Moses, or Torgovnick*

189S. Special Topics in Film. C-L: Drama 197S. *Clum or Gaines*

190. Television, Technology, and Culture. C-L: Drama 139. *Gaines*

History

127S. History and the Visual Image. *Bergquist, TePaske, or Wood*

Institute of the Arts

186S. Video and Performance. *Desmond*

Political Science

153, 154. Politics and the Media of Mass Communication. *Paletz*

203S. Politics and the Media of Mass Communication. *Paletz*

Public Policy Studies

154S. Journalism and Public Policy. *Staff*

163S. Telecommunications Policy and Regulation. *Geller and staff*

176S. American Communities: A Photographic Approach. *Harris*

180. Writing for the Media. *Staff*

186S. Shaping the News. *Barber*

240S. Analyzing the News. *Entman*

Romance Languages

French 122. The French Film. *Staff*

French 170. Film and the French Novel. *Jameson*

Italian 137. The Italian Film. *Staff*

Sociology

170. Mass Communication. C-L: Canadian Studies and Comparative Area Studies. *Smith*

182. The Media in Comparative Perspective. C-L: Interdisciplinary Course 182 and Political Science 180.
Paletz or Smith

Forestry and Environmental Studies Courses (FES)

The professional school courses listed below are described fully in the *Bulletin of Duke University: School of Forestry and Environmental Studies*. They are open to undergraduates by consent of the instructor. No major is offered to undergraduates.

Students who are preparing for professional careers in natural resources and the environment should refer to the section on undergraduate-professional combination programs in this bulletin.

191, 192. Independent Study. Open to qualified juniors and seniors with consent of the student's major adviser and the instructor. Credit to be arranged. *Staff*

194. Conserving Natural Resources. Open to undergraduates only. One course. *Staff*

200. Student Projects. Prerequisite: consent of the dean of the School of Forestry and Environmental Studies. Credit to be arranged. *Staff*

201. Field Studies. Credit to be arranged. *Staff*

204. Forest Inventory, Growth, and Yield. One course. *Davison*

205. Silviculture. One course. *Oren*

207L. Forest Pest Management. One course. *Stambaugh*

208. Fire Behavior and Use. One course. *Staff*

210L. Forest Pathology. One course. *Stambaugh*

211L. Applied Ecology and Ecosystem Management. One course. *Richardson*

213. Forest Ecosystems. One course. *Richter*

215. Environmental Physiology. One course. *Di Giulio and Oren*
 216. Applied Population Ecology. One course. *Maguire*
 218. Barrier Island Ecology. Prerequisite: course in general ecology. (Given at Beaufort.) C-L: Botany 218 and Marine Sciences. One and one-half courses. *Staff*
 221L. Forest Soils. One course. *Richter*
 230. Weather and Climate. One course. *Knoerr*
 231. Environmental Climatology. One course. *Staff*
 232. Microclimatology. C-L: Botany 232. One course. *Knoerr*
 234. Watershed Hydrology. One course. *Marin*
 236. Water Quality Management. One course. *Reckhow*
 237. Watershed Modeling and Management. Prerequisite: Forestry and Environmental Studies 234. One course. *Knoerr and Marin*
 251. Natural Resource Data Analysis. One course. *Wilkinson*
 261. Remote Sensing for Resource Management. One course. *Davison*
 267. Wildland and Wildlife Management. One course. *Staff*
 269. Business Aspects of Natural Resources. One course. *MacKinnon*
 270. Resource Economics and Policy. Prerequisite: introductory course in economics or consent of instructor. C-L: Public Policy Studies 272. One course. *Hyde*
 283. Environmental Policy and Values. One course. *Staff*
 285. Land Use Principles and Policy. One course. *Healy*

French

For courses in French, see Romance Languages.

The University Program in Genetics

Professor Antonovics, *Director*, (botany); Professors Amos (immunology), Bastia (microbiology), Boynton (botany), Counce (anatomy), Gillham (zoology), Gross (biochemistry), Joklik (microbiology), Kredich (medicine and biochemistry), Modrich (biochemistry), Moses (anatomy), Nicklas (zoology), C. Ward (zoology), F. Ward (immunology), and Webster (biochemistry); Associate Professors Endow (microbiology), Greene (biochemistry), Greenleaf (biochemistry), Hershfield (medicine and biochemistry), Hsieh (biochemistry), Keene (microbiology), Linney (microbiology), Rausher (zoology), Ruderman (zoology), Steege (biochemistry), and Uyenoyama (zoology); Assistant Professors Burdett (microbiology), Holmes (medicine and biochemistry), Johnston (botany), Kaufman (biochemistry), Kreuzer (microbiology), Ostrowski (microbiology and immunology), and Schachat (anatomy); Professor Emeritus Guild; Adjunct Professors Drake (National Institute of Environmental Health Sciences), Judd (National Institute of Environmental Health Sciences), Kunkel (National Institute of Environmental Health Sciences), Lucchesi (University of North Carolina), Resnick (National Institute of Environmental Health Science), and Sugino (National Institute of Environmental Health Sciences)

A certificate, but not a major, is available in this program.

Acceptance into the certificate program is by arrangement with the Director of the Genetics Program. It is open to majors in all disciplines. The program offers students an opportunity to gain expertise in modern genetics with a view to its application to biology, medicine, public policy, law, or engineering. The courses in the certificate program are taught by members of the University Program in Genetics. Further details may be obtained from the Genetics Program office.

For descriptions of the courses below consult the listings under the specified departments.

Required Courses:

- Introductory Biology (Biology 14)
- Principles of Genetics (Botany/Zoology 180)
- An advanced course in molecular genetics, for example,
 - Molecular Biology (Botany 105)
 - Molecular Biology II. Nucleic Acids (Biochemistry 268)
 - Molecular Biology of Development (Zoology 164)

Independent study with a member of the Genetics Program (University Program in Genetics 191, 192)

Additional Courses:

Any Genetics Program courses listed below.

Also: Introductory Biochemistry (Biochemistry 227)

Principles of Cell Biology (Zoology 160)

Advanced Cell Biology (Zoology 269)

Molecular Biology. (Botany 105.) One course. *Johnston*

The Molecular Biology of Development. (Zoology 164.) One course. *Ruderman*

Principles of Genetics. (Botany 180, Botany 280, Zoology 180, and Zoology 280.) One course. *Antonovics, Boynton, and Gillham*

Genetic Mechanisms. (Biochemistry 215.) One course. *Webster and staff*

Molecular Biology II: Nucleic Acids. (Biochemistry 268.) One course. *Modrich and staff*

Extrachromosomal Inheritance. (Botany 283 and Zoology 283.) One course. *Boynton and Gillham*

Ecological Genetics. (Botany 285S.) One course. *Antonovics*

Evolutionary Mechanisms. (Botany 286 and Zoology 286.) One course. *Antonovics, Uyenoyama, and H. Wilbur*

Independent Study and Special Problems. (Botany 191, 192, 225T, and 226T; Zoology 191 and 192.) Prerequisite: consent of instructor and the appropriate Director of Undergraduate Studies prior to registration.

Mathematical Population Genetics. (Zoology 288.) Calculus required; statistics and linear algebra recommended. One course. *Uyenoyama*

The Molecular Biology of Development. (Zoology 164.) One course. *Ruderman*

Geology (GEO)

Professor Perkins, *Chairman*; Associate Professor Corliss, *Director of Undergraduate Studies*; Professors Heron and Pilkey; Associate Professors Johnson, Karson, and Rosendahl; Assistant Professors Baker and Strelitz

A major is available in this department.

The department offers introductory and advanced courses in all branches of geology including petrology, geochemistry, geophysics, paleontology, sedimentology and marine geology. The degree requirements emphasize a broad knowledge of both geology and the associated physical sciences. An option is available for one semester of study at the Duke University Marine Laboratory in Beaufort, North Carolina, to fulfill elective requirements for the degree. The B.S. degree in geology provides a strong background for graduate work in earth sciences; the B.S. and A.B. degrees provide background for work in fields allied to geology—environmental law, hydrology, waste disposal, engineering geology, and secondary education.

10S. Analysis of Outcrops. Field interpretation of geologic features. Includes four field trips. Prerequisite: Geology 41 (may be taken concurrently). Half course. *Staff*

41. Introduction to Geology. Earth composition, processes, and structure. One course. *Heron and staff*

43S. Application of Geologic Principles. Mineral and rock classification, topographic and geologic map interpretation. Prerequisite: Geology 41 (may be taken concurrently). Half course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

53. Introductory Oceanography. See C-L: Botany 53. One course. *Pilkey and Searles*

72. History of the Earth. Physical and biological evolution of the earth from the viewpoint of global tectonics. Primarily for science majors. Fee for field trips. Weekend field trip through the Appalachians, and Saturday field trip through the Deep River Triassic Basin. Prerequisite: Geology 41 or consent of instructor. One course. *Corliss*

105. Fundamentals of Mineralogy. Crystal chemistry, crystal physics, mineral identification, and genesis. Lectures or recitations, laboratory, and field trips. Prerequisite: Chemistry 12 (may be taken concurrently). One course. *Staff*

106. Igneous and Metamorphic Rocks. Silicate mineralogy, theory of origin and classification of igneous and metamorphic rocks, and rock identification. Lectures and laboratory. Prerequisite: Geology 105. One course. *Staff*

108. Sedimentary Rocks. Authigenic and detrital minerals, theory of origin and classification of sedimentary rocks, and rock identification. Lecture, laboratory, and field trips. Prerequisite: Geology 72 or 105 or consent of instructor. One course. *Heron*

109S. Marine Sediments. Sedimentary processes in nearshore, shelf and deep-sea environments. Emphasis on field methods and laboratory analyses. (Given at Beaufort.) C-L: Marine Sciences. One course. *Johnson*

111. Stratigraphic Principles and Applications. Prerequisites: Geology 72 and 108 or consent of instructor. One course. *Perkins*

130. Principles of Structural Geology. Description, origin, and interpretation of primary and secondary geologic rock structures. Prerequisites: Geology 106 and 108. One course. *Karson*

145. Invertebrate Paleontology. Biologic and stratigraphic relationships of invertebrates and their phylogeny. Lectures and laboratory. Prerequisite: Geology 72 or consent of instructor. One course. *Corliss*

191, 192. Independent Study. Directed reading or research. Open only to qualified juniors and seniors by permission of the Director of Undergraduate Studies and supervising instructor. One course each. *Staff*

195. Independent Study for Nonmajors. Open to qualified juniors and seniors upon approval of the departmental faculty. One course. *Staff*

196S. Beach and Island Geological Processes. Processes affecting evolution of beaches and barrier islands with emphasis on the effect of constructions. (Given at Beaufort on three weekends.) C-L: Marine Sciences. Half course. *Pilkey*

For Advanced Undergraduates and Graduates

200. Beach and Coastal Processes. The study of sedimentary processes and geomorphology of nearshore environments with emphasis on both developed and undeveloped barrier island systems. One course. *Pilkey*

203. Physical Oceanography. Physical processes in the oceans: the physical properties of seawater, the dynamics of currents, waves, and tides, and the transmission of light and sound in the sea. (Given at Beaufort.) Prerequisite: Physics 41 or 51. C-L: Marine Sciences. Half course. *Johnson*

204. Chemical Oceanography. An introduction to chemical processes in the oceans: including factors controlling the major ion composition of sea salt, the distribution of dissolved gases in seawater, sediment-seawater interactions, and seawater-basalt interactions at oceanic ridge crests. (Given at Beaufort.) Prerequisites: Chemistry 11 and Geology 203 (may be taken concurrently). C-L: Marine Sciences. One course. *Staff*

205S. Geological Oceanography. The geology of ocean basins, including origin, bottom physiography, sediment distribution, and sedimentary processes. Not open to students who have taken Geology 206S. (Given at Beaufort.) C-L: Marine Sciences. One course. *Johnson*

206S. Principles of Geological Oceanography. Geological aspects of the ocean basins including coastal to deep water sediment types and sedimentation processes, sea floor physiography and environmental problems. One course. *Pilkey*

208S. Paleoceanography. Application of stratigraphic, paleontologic, and geochemical evidence in sediments to understanding ancient oceans and climates. Prerequisite: Geology 206S or consent of instructor. One course. *Baker*

209S. Marine Sediments. Same as 109S except additional term paper required. C-L: Marine Sciences. One course. *Johnson*

212. Carbonate Facies Analysis: Recent and Ancient. Origin, distribution, and diagenetic alteration of recent carbonate sediments and their ancient analogs. Prerequisite: Geology 111. One course. *Perkins*

214S. Sedimentary Petrography. Descriptive and interpretive analysis of sediments and sedimentary rocks in thin section, with an emphasis on diagenesis. Prerequisite: consent of instructor. One course. *Perkins*

215. Clastics Facies Analysis: Recent and Ancient. Modern clastic depositional systems and their ancient analogs. Prerequisite: Geology 111. One course. *Heron*

216. Field Analysis of South Florida Carbonates. Analysis of recent sediments and organisms and their Pleistocene analogs. One-week field trip. Pass/fail grading only. Prerequisite: Geology 111 or consent of instructor. Half course. *Perkins*

217. Field Analysis of Ancient Sedimentary Sequences. Regional analysis of ancient clastic and carbonate systems. One-week field trip. Pass/fail grading only. Prerequisite: Geology 111 or consent of instructor. Half course. *Heron and Perkins*

230S. Advanced Topics in Structural Geology and Tectonics. Selected topics related to the deformation of rocks, ranging from microstructure to plate tectonics. Prerequisite: Geology 130 or consent of instructor. One course. *Karson*

233. Oceanic Crust and Ophiolites. Structure, tectonics, petrology, and geochemistry of oceanic spreading environments and ophiolite complexes. Prerequisites: Geology 106 and 130 or consent of instructors. One course. *Karson*

236. Lithosphere Plate Boundaries. Plate tectonics and the geological and geophysical expression of orogenic belts, spreading centers, transform faults, subduction zones. Prerequisite: Geology 130 or consent of instructors. One course. *Karson and Rosendahl*

249. Marine Micropaleontology. Introduction to marine microfossils, basic principles of micropaleontology and stable isotope geochemistry with applications to paleoceanography. Lectures and laboratory. Prerequisite: Geology 206S or consent of instructor. One course. *Corliss*

251. Physics of the Earth. Origin, primeval evolution, rotation, potential fields, paleomagnetism, gravity anomalies, earthquake seismology, thermal properties, internal structure of the earth, and thermodynamics of plate motions. Prerequisites: Geology 41, Chemistry 12, Mathematics 32, and Physics 52; or consent of instructor. One course. *Strelitz*

252. Exploration Seismology. Elastic wave theory, reflection and refraction of acoustic waves, field methodologies, computer processing, and interpretation of seismic data. Prerequisites: Geology 41, Mathematics 32, Computer Science 51, and Physics 52; or consent of instructor. One course. *Rosendahl*

255. Seismic Interpretation. Basic rock physics, seismic expression of structural styles, seismic facies analysis, maps generated from seismic data, and basin-wide seismic stratigraphic analysis. Prerequisite: Geology 251; corequisite: Geology 252 or consent of instructor. One course. *Rosendahl and staff*

260S. Hydrocarbon Exploration. Origin, migration, and accumulation of hydrocarbons with emphasis on exploration techniques. Prerequisites: Geology 111 and 251. One course. *Perkins and Rosendahl*

270. Sedimentary Geochemistry. Chemistry of aqueous solutions and authigenic minerals in sedimentary systems. Prerequisites: Chemistry 12 and Mathematics 32. One course. *Baker*

271. Isotope Geochemistry. Theory and applications of stable and radioactive isotope distributions in nature. Prerequisites: Chemistry 12 and Mathematics 32. One course. *Baker*

272. Biogeochemistry. Processes controlling the circulation of carbon and biochemical elements in natural ecosystems and at the global level, with emphasis on soil and surficial processes. Prerequisite: Chemistry 12, Botany 146L, or equivalent. C-L: Botany 272. One course. *Schlesinger*

275. Economic Geology. Geology and geochemistry of ore deposits. Prerequisite: consent of instructors. One course. *Baker*

281S. Advanced Topics in Igneous Petrology. Current topics in igneous petrology including andesite petrogenesis, ocean ridge basalts, and experimental petrology. Prerequisites: Geology 105 and 106. One course. *Staff*

283S. Experimental Methods in Geology. Theory and application of experimental techniques in igneous and metamorphic petrology and high- and low-temperature geochemistry, with examples from recent literature. Prerequisites: Geology 105 and 106 or consent of instructor. One course. *Staff*

292. Computer Methods in Geology. Techniques used in the geological sciences including simulation and forward modeling, inverse and least squares methods, statistical methods and exploratory data analysis as well as graphics. Prerequisites: Mathematics 32 and Computer Science 51, or consent of instructor. One course. *Strelitz*

295S. Advanced Topics in Geology. Topics, instructors, and credits to be arranged each semester. Variable credit. *Staff*

COURSES CURRENTLY UNSCHEDULED

1. Introductory Geology

253S. Geophysics

THE MAJOR

For the A.B. Degree

Prerequisites. Geology 41 and 72; Chemistry 11 and 12; and Mathematics 31 and 32.

Major Requirements. A minimum of eight geology courses above the introductory levels, including 105, 106, 108, 111, 130, and 145.

For the B.S. Degree

The Department of Geology offers two programs:

Geology: Preparatory to Advanced Studies in Geology

Prerequisites. Geology 41 and 72; Chemistry 11 and 12; Mathematics 31 and 32; Physics 41 and 42 or 51 and 52; and Computer Science 51.

Major Requirements. Required courses include 105, 106, 108, 111, 130, 145, a field course normally taken during the summer after the junior year, and three other geology courses above the introductory level.

Geology: Preparatory to Advanced Studies in Oceanography

Prerequisites. Geology 41 and 72; Geology 53 (or 206); Chemistry 11 and 12; Physics 41 and 42 or 51 and 52; Biology 14; Mathematics 31 and 32; and two courses of science electives.

Major Requirements. A minimum of seven geology courses above the introductory level, including 105, 106, 108, 111, 130, and 145.

Germanic Languages and Literature

Associate Professor Borchardt, *Chairman*; Assistant Professor Bessent, *Director of Undergraduate Studies and Supervisor of Freshman Instruction*; Associate Professors Alt and Rolleston; Assistant Professor Morton; Professor Emeritus Phelps; Instructors Johns and Koeppe; Lecturers Bernstein, Dowell, and Kentgens-Craig

A major is available in this department.

GERMAN (GER)

1-2. Elementary German. Practice in understanding, speaking, reading, and writing. Classroom techniques are combined with those of the language laboratory and the computer. Two courses. *Bessent and staff*

14. Intensive German. Accelerated introduction to German, combining in one semester the work of German 1-2. Classroom theory and practice with extended exposure to language laboratory and computer programmed instruction. Prerequisite: consent of Director of Undergraduate Studies. Two courses. *Bernstein*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

63. Intermediate German. Prerequisite: German 1-2 or equivalent. One course. *Bernstein and staff*

German 63 is usually followed by 76, 100S, 101, or 117S.

65-66. German in Review. Grammar review, reading of literary and cultural texts, oral practice, and laboratory. Not open to students who have had German 63. Prerequisite: German 1-2, 14, or equivalent. Two courses. *Dowell*

76. Advanced Intermediate German. Specially designed to raise proficiency levels in speaking and reading. Prerequisite: German 63, 66, or equivalent. One course. *Koeppe*

100S. Business German. Introduction to the language of commerce and industry; modes of expression for technology and marketing. Prerequisite: consent of instructor. One course. *Koeppe*

101. Introduction to German Literature. Readings from representative German authors. One course. *Bessent*

102. German for Legal Studies. Legal terminology and concepts; reading of legal documents (codes, cases, contracts, wills); communication about legal and law-related issues. Prerequisites: German 63 or equivalent and consent of instructors. C-L: Law 102. One course. *W. Bernstein and H. Bernstein*

103S, 104S. Undergraduate Seminars. Topics vary. One course each. *Staff*

105. Composition. Syntax with practice in the elements of German expository style, recommended for majors. One course. *Bessent and staff*

109S. Nineteenth-Century Prose Fiction. Emphasis on shorter forms: novelle, fairy tale, legend. One course. *Bessent*

115S. Drama. Development of German drama and stagecraft from *Sturm und Drang* to Brecht's *Epic Theater*. C-L: Drama 124S. One course. *Alt*

117S, 118S. German Conversation and Composition. Primarily conversation with oral and written reports, based on works by contemporary writers of East and West Germany. Required for German majors; other students by consent of instructor. One course each. *Bernstein, Bessent, Johns, Kentgens-Craig, or Koeppel*

119S, 120S. Advanced Intensive German. For advanced students to increase conversational skills. Discussion of current events based on newspaper articles. Emphasis on the finer points of German grammar and style. Equivalent of German 117S, 118S but offered only in the Berlin semester program. One course each. *Staff*

124S. Reason and Imagination. The eighteenth-century revolution in thought and sensibility, and its impact on literature: nature and the organic paradigm, genius, national cultures, and history as evolution and as progress. Lessing, Herder, Klopstock, Wieland, and Lenz. One course. *Morton*

125S. German Literature to World War I. Selected nineteenth- and early twentieth-century texts to explore and define elements of the modern. Kleist, Hoffmann, Büchner, Heine, Nietzsche, and Thomas Mann. One course. *Alt or Rolleston*

126S. German Literature since World War I. From expressionism to the present, the social and intellectual contexts. Mann, Kafka, Rilke, Böll, and Grass. One course. *Rolleston*

127S. Contemporary Germany. The current literary scene in the two Germanies in its cultural, social, and political contexts. C-L: Comparative Area Studies. One course. *Bessent*

129. Deutsche Kulturgeschichte. An analysis of the larger historical, political, and cultural developments and their influences on present-day Germany. C-L: Comparative Area Studies. One course. *Staff*

130. German Life and Thought. German cultural and intellectual history. Reading and discussion in English. Taught in English. C-L: Comparative Area Studies. One course. *Borchardt*

131S. Goethezeit. The struggle for order in an age of revolution. Weimarer classicism and the response to the romantic impulse. Herder, Goethe, Schiller, Jean Paul, and Hölderlin. One course. *Morton*

132. The Romantics. Major writers of the romantic movement (1795-1830) considered in their national and international context. One course. *Rolleston*

137. Aspects of Contemporary German Culture. Offered as part of summer program in Erlangen. One course. *Staff*

172. Modern German Literature in English Translation. Representative works by such writers as Mann, Kafka, Hesse, Brecht, Böll, and Grass. Taught in English. One course. *Borchardt or Morton*

173. Goethe's *Faust* in English Translation. The poem, its place in world literature, and its cultural and historical backgrounds. One course. *Borchardt*

175. Consciousness and Modern Society. The blend of philosophy, literature, and sociology in German thinking about actual and possible societies. The idea of consciousness as producing involvement, detachment, or transformation. Marx, Nietzsche, Lukacs, Freud, Marcuse, Benjamin, Adorno, and Habermas. Texts and discussion in English. C-L: Comparative Area Studies. One course. *Rolleston*

181. German for Reading, I. Foundations of German grammar and syntax; emphasis on vocabulary and complex verbal structures. Not open for credit to students who have completed German 1-2 or the equivalent. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Open only to qualified students in the junior year, by consent of Director of Undergraduate Studies. One course each. *Alt, Bessent, Borchardt, Morton, or Rolleston*

193, 194. Independent Study. Directed reading and research. Open only to qualified students in the senior year, by consent of the department. One course each. *Alt, Bessent, Borchardt, Morton, or Rolleston*

For Seniors and Graduates

200S. Proseminar. Fundamental course for advanced study of German. Literary history; schools of criticism; practical exercises in interpretation and research methods. One course. *Alt*

201S, 202S. Goethe. His life and works, in the light of his lasting significance to Germany and world literature. 201S: lyrics, prose, fiction, and selected dramas. 202S: *Faust I and II*. One course each. *Morton*

205, 206. Middle High German. The language and literature of Germany's first classical period. C-L: Linguistics and Medieval and Renaissance Studies. One course each. *Staff*

207S. German Romanticism. The principal writers of the period from 1795 to 1830. One course. *Rolleston*

209S. Drama. Studies in the German-speaking theater with emphasis on the nineteenth century. C-L: Drama 220S. One course. *Alt*

210S. The Eighteenth Century. The culture of reason, progress, and the individual in early modern philosophy and literature. Leibniz, Lessing, Herder, Kant, and Schiller. One course. *Morton*

211S. Nineteenth-Century Literature. From the end of Romanticism through realism. One course. *Alt*

214S. The Twentieth Century. Literature of the twentieth century presented through representative authors. One course. *Rolleston*

215S. Seventeenth-Century Literature. Leading writers of the baroque, viewed against the background of their time. C-L: Medieval and Renaissance Studies. One course. *Borchardt*

216. History of the German Language. Development of the phonology, morphology, and syntax of German from the beginnings to the present. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Staff*

217S. Renaissance and Reformation Literature. The period from 1400 to about 1600. C-L: Medieval and Renaissance Studies. One course. *Borchardt*

218S. The Teaching of German. A survey of modern teaching techniques: problems in the teaching of German on the secondary and college levels. Analysis and evaluation of textbooks, related audiovisual materials, and computer programs. One course. *Alt*

219. Applied Linguistics. The application of modern linguistic principles to a systematic study of the phonetics, morphology, and syntax of modern German. C-L: Linguistics. One course. *Staff*

230S. Lyric Poetry. Studies in poetry and poetic theory. From Goethe and the romantics to Rilke, Benn, and contemporary authors. One course. *Rolleston*

Courses Currently Unscheduled

182. German for Reading, II

YIDDISH (YDH)

181, 182. Elementary Yiddish. A thorough study of elementary Yiddish grammar with reading, composition and oral practice. No previous knowledge of German or Hebrew required. C-L: Judaic Studies. One course each. *Alt*

Courses Currently Unscheduled

171. Yiddish Fiction in Translation

191, 192. Independent Study

THE MAJOR

Students majoring in German develop language skills in their cultural and literary context. The international and humanistic emphasis makes the German major an appropriate companion to technical and career-oriented concentrations. Numerous opportunities are available, including programs of study abroad, interdisciplinary programs, and Fulbright and German Academic Exchange Service (DAAD) scholarships.

Prerequisites. Elementary and intermediate German.

Major Requirements. Conversation and composition (German 117S, 118S or equivalent), plus six advanced courses, three of which must be at the 200 level. The following courses may not be used to fulfill major requirements: 172, 173, 181, 182. Either 130 or 175 (but not both) may count towards the major.

Honors. Any student who is qualified (see the section on honors in this bulletin) may undertake work toward a degree with distinction in German by applying to the Director of Undergraduate Studies.

Greek

For courses in Greek, see Classical Studies.

Health, Physical Education, and Recreation (PE)

Professor Buehler, *Chairman*; Associate Professor Spangler, *Director of Undergraduate Studies*; Professor Friedrich; Associate Professors Harvey, LeBar, Lloyd, Raynor, Skinner, and Woodyard; Part-time Instructors Beguinet, Bowen, Falcone, Forbes, Gringle, McCauley, McNutt, Orr, Riehl, Sharpe, Strome, Thompson, Trout, and Wilson

Courses in this program do not count toward distributional requirements.

ACTIVITY COURSES

The activity courses listed below may be taken by men and women unless otherwise indicated. Each course carries a half-course credit and is given on a pass/fail basis. The maximum amount of credit that counts for the undergraduate degree is one full course, but additional courses may be taken without credit toward graduation.

10. Adapted Physical Education. Individualized programs for permanently or temporarily disabled students. Half course. *Staff*

11. Cardiorespiratory Conditioning and Aerobics. Individualized programs in walking, jogging, running, cycling, and swimming. Half course. *Buehler*

12. Dancing for Health. Dancing for cardiovascular and physical conditioning. Half course. *Sharpe*

13. Weight Control. Individualized exercise and diet programs. Prerequisite: consent of physician. Half course. *Staff*

- 14. Tension Control.** Techniques for recognizing and reducing tension. Half course. *Friedrich*
- 15. Weight Training.** Progressive, cumulative, and measurable physical conditioning. Half course. *Harvey*
- 16. Endurance Swimming.** Individualized programs to improve skills and fitness. Half course. *Spangler*
- 20. Beginning Swimming.** Propulsion techniques, water safety, introduction to the five basic strokes. Half course. *Spangler*
- 21. Intermediate Swimming.** Development of the five basic strokes, overarm side trudgen, and trudgen crawl. Half course. *Spangler*
- 22. Advanced Swimming.** Skill development and endurance. Half course. *Spangler*
- 24. Lifesaving.** American Red Cross Advanced Lifesaving certification. Half course. *Woodyard*
- 25. Water Safety Instructors Course.** American Red Cross Water Safety Instructors certification. Half course. *Woodyard*
- 26. Scuba Diving.** Half course. *Thompson*
- 27. Kayaking.** Basic skills for kayaking in whitewater. Half course. *Harvey*
- 28. Canoeing.** Basic skills for canoeing in whitewater. Half course. *Friedrich*
- 30. Beginning Golf.** Half course. *Lloyd*
- 31. Intermediate Golf.** Stroke development and use of all clubs. Half course. *Lloyd*
- 32. Advanced Golf.** Use of all clubs; course strategy. Emphasis on playing. Half course. *Lloyd*
- 40. Beginning Tennis.** Half course. *LeBar*
- 41. Intermediate Tennis.** Strategy of the game and stroke development. Half course. *LeBar*
- 42. Advanced Tennis.** Stroke development with emphasis on strategy. Half course. *LeBar*
- 43. Racquetball.** Half course. *Skinner*
- 44. Badminton and Racquetball.** Half course. *Friedrich*
- 45. Advanced Racquetball.** Development of competitive skills. Half course. *Friedrich*
- 48. Men's Competitive Tennis.** High level drills, strategy, mental and physical conditioning for those interested in tennis competition. Half course. *LeBar*
- 49. Women's Competitive Tennis.** See Physical Education 48. Half course. *LeBar*
- 50. Mixed Competitive Tennis.** See Physical Education 48. Half course. *LeBar*
- 51. Self-Defense: Karate.** Fundamentals of selected martial arts. Half course. *Bowen*
- 52. Fencing.** Foils, épée, and saber. Half course. *Beguinet*
- 53. Intermediate Fencing.** Further study of basics and theory. Half course. *Beguinet*
- 56. Intermediate Karate.** Continued practice of basic technique. Introduction to round kick, back kick, free sparring, four Pinan Katas of the Wadoryu System. Half course. *Bowen*
- 60. Volleyball.** Half course. *Wilson*

65. Yoga. Traditional hatha yoga combined with balanced structural alignment to develop strength, flexibility, and mental concentration. Half course. *Orr*

70. Folk Dancing. Dances and music, folklore, and costumes. Half course. *Wray*

71. Square Dancing. Calls and steps. Half course. *Staff*

72. Social Dancing. Waltz, foxtrot, tango, cha-cha, rumba, jitterbug, rock, disco, and others. Half course. *Trout*

80. Equestrian. Skills in balance seat riding: walk, trot, and canter. Half course. *Staff*

81. Advanced Equestrian: Hunt Seat. Cross-country and stadium jumping techniques. Half course. *Staff*

93. Orienteering. Route selection and techniques of map reading, compass use, and navigation. Films, lectures, and field practice. Half course. *McNutt*

95. Wilderness Skills. Basic and/or intermediate outdoor camping and leadership skills: orienteering, navigation, campcraft, equipment, trip planning, first aid and safety, with emphasis on "learning by doing." Half course. *McNutt*

THEORY COURSES

100. Advanced First Aid and Cardiopulmonary Resuscitation. Certification in advanced first aid and CPR. Half course. *Raynor*

102. Teaching Elementary Physical Education. Theory and practice in teaching basic skills, rhythms, and games for grades K-6. Half course. *Spangler*

110. Diet and Nutrition. Health implications of diet and nutrition: alcohol as food and beverage, anorexia and bulimia, vegetarian options, exercise, "junk" foods, food additives, and other topics. Half course. *Gringle*

112. Alcohol and Society. Historical and legal perspectives; alcohol use on college campuses, problem drinking, alcohol dependence, and options for treatment for the alcohol-troubled person. Half course. *Gringle*

115. Care and Prevention of Athletic Injuries. Basic instruction in prevention, recognition, care, and rehabilitation of athletic related injuries. Half course. *Riehl*

134. Elementary School Health. Organization of health programs, basic health problems, and teaching methods and materials for grades K-6. Half course. *Staff*

136. Health and Fitness. Theory and practice of personal health: body mechanics, exercise, weight control, and nutrition. Recent research in sports medicine. One course. *Strome*

170. History of Sports. Sports from ancient to modern times with an emphasis on sports in America. One course. *Friedrich*

171. Recreation Leadership. Concepts and techniques with an emphasis on organizing recreation for special groups. One course. *Friedrich*

174. Health and Wellness for the College Student. A problem-solving approach to health concerns. One course. *Friedrich*

Hindi—Urdu

For courses in Hindi-Urdu, see Asian and African Languages.

History (HST)

Professor Lerner, *Chairman*; Professor C. Davis, *Director of Undergraduate Studies*; Professors Bergquist, Cahow, Cell, Chafe, Colton, Durden, Holley, Kuniholm, Mauskopf, Oates, Richards, Roland, A. Scott, W. Scott, TePaske, Witt, and Young; Associate Professors Dirlik, English, Gaspar, Gavins, Goodwyn, Gordon, Keyssar, Koonz, Miller, S. Nathans, Reddy, and Wood; Assistant Professors R. Davis, Ewald, Green, Herrup, Neuschel, and Robisheaux; Professors Emeriti Ferguson, Franklin, Parker, Preston, Ropp, and Watson; Lecturers Grimes, E. Nathans, Roberts, and Wilson

A major is available in this department.

History courses offer students from all disciplines within the University an opportunity to investigate the past, gain perspective on the present, and improve their critical faculties. History provides an integrating principle for the entire learning process, and students of history gain a sense of human development, an understanding of fundamental and lasting social processes, and a feeling for human interrelatedness. History courses train the mind by improving skills in communicating thought and imagination.

INTRODUCTORY COURSES

Students are urged, but not required, to take two introductory courses before proceeding to advanced-level courses. Majors take a sequence of two introductory courses in history (21, 22; 21S, 22S; 23; 25, 26; 53, 54; 75, 76; 91, 92; 91S, 92S or 93S). Additional courses may be chosen from this group as electives or part of the departmental major.

21. Europe to the Eighteenth Century. Development and world impact of European civilization, critical evaluation of historical interpretations, and investigation of history from primary sources. One course. *Staff*

21S. Europe to the Eighteenth Century. A seminar version of History 21. One course. *Staff*

22. Europe from the Eighteenth Century. Development and world impact of European civilization, critical evaluation of historical interpretations, and investigation of history from primary sources. One course. *Staff*

22S. Europe from the Eighteenth Century. A seminar version of History 22. One course. *Staff*

23. Europe to the Eighteenth Century. Readings, lectures, and discussions in *French*; examinations in English. Development and world impact of European civilization, critical evaluation of historical interpretations, and investigation of history from primary sources. Satisfies History 21 requirement for history majors. Prerequisite: French advanced placement credit or French achievement test score of 600 or above; or equivalent. One course. *Witt*

25. Introduction to World History: To 1700. The beginning and evolution of civilization; major traditions of Eurasia (Greek, Christian European, Indian, Chinese, Islamic); Africans and American Indians; the European invasion of America; foundations of the European world economy; Europe's preparation for world hegemony. C-L: Comparative Area Studies. One course. *Staff*

26. Introduction to World History: Since 1700. Establishment of European political, economic, and cultural hegemony; non-Western responses; the decline of Western hegemony. C-L: Comparative Area Studies. One course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

53. Greek History. See C-L: Classical Studies 53. One course. *Rigsby*

54. Roman History. See C-L: Classical Studies 54. One course. *Boatwright*

75, 76. The Third World and the West. Economic, social, political, and cultural relationships, 1500 to the present. C-L: Comparative Area Studies. One course each. *Bergquist, R. Davis, Dirlik, Ewald, Gordon, or Richards*

91. The Development of American Democracy to 1865. The trends vital to an understanding of the United States today. The development of American democracy. Problems of foreign policy, the growth of capitalism, political practices, social reform, and conflicting ideals are considered in relation to this main theme. One course. *Staff*

91S. The Development of American Democracy to 1865. Seminar version of History 91. One course. *Staff*

92. The Development of American Democracy, 1865 to the Present. A continuation of History 91 with emphasis upon the emergence of contemporary problems in the United States. Students who have taken History 93S may not receive credit for History 92. One course. *Staff*

92S. The Development of American Democracy, 1865 to the Present. Seminar version of History 92. One course. *Staff*

93S. Modern American History. Same as History 92, but emphasizing additional topics considered appropriate for the Program in Twentieth-Century America. Open only to students in that program. One course. *Staff*

UNDERGRADUATE COLLOQUIA

Colloquia are open without prerequisite to all undergraduates and are designed for the nonspecialist, although history majors may take them for credit. Each colloquium consists of reading and discussion involving an explicit historical theme. Short papers, reports, and a final examination may be required. Unlike seminars, which emphasize materials and methods of historical research, colloquia concentrate on historical literature.

101G, 102G. Introduction to Islamic Civilization. See C-L: Interdisciplinary Course 162, 163; also C-L: Anthropology 147, 148; Comparative Area Studies; and Religion 162, 163. One course each. *Lawrence and staff*

101H. Structures, Science, and Society. The historical and scientific importance of selected structures. Monuments, buildings, bridges, and machines from Stonehenge to nuclear reactors. (Taught in summer program in London.) One course. *Mauskopf*

UNDERGRADUATE SURVEY COURSES

100. Science and Technology in the Ancient World. See C-L: Classical Studies 101. One course. *Rigsby*

103. History of Greek and Roman Civil Law. See C-L: Classical Studies 102. One course. *Oates*

104. The Intellectual Life of Europe, 1250-1600. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Robisheaux or Witt*

105. Brazilian History in Comparative Perspective. A survey of Brazilian history from colonial times to the present with emphasis on the nineteenth and twentieth centuries. Social, cultural, economic, and political issues in comparative Latin American perspective. (Taught in summer program in Brazil.) One course. *Bergquist*

107, 108. Social and Cultural History of England. English history from the fourteenth century to the present time in an effort to arrive at a synthesis of ideas, social conditions, and political events and thus provide a background for the study of English literature. 107 cross-listed with Medieval and Renaissance Studies. C-L: Comparative Area Studies. One course each. *Cell or Herrup*

- 109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy.** C-L: Anthropology 109, Comparative Area Studies, Interdisciplinary Course 109, Political Science 160, Religion 156, and Sociology 175. One course. *Staff*
- 111. Early America to 1760.** Pre-Columbian explorations, European invasion of North America, the evolution of race slavery, and the responses of the native American peoples. One course. *Wood*
- 112. Era of the American Revolution, 1760-1815.** Origins, evolution, and consequences. Attention to economic, social, and geographical questions, as well as military and political. One course. *Wood*
- 113. The United States from the 1890s to 1940.** Economic, social, and political history of the United States from the Populist revolt to the end of the New Deal. One course. *Keyssar*
- 115. History of Africa.** Social, political, and economic development in sub-Saharan Africa from 1400 to the present. C-L: Comparative Area Studies and Women's Studies. One course. *Ewald*
- 117. Early Modern Europe.** The economic, social, and political history of early modern Europe. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Neuschel*
- 119. Modern European Intellectual and Cultural History.** The period between the French Enlightenment and the First World War: nationalism, ideology, revolution, and social theory; the writings of Hegel, Marx, Nietzsche, and Freud. C-L: Comparative Area Studies. One course. *M. Miller*
- 120. History of Socialism and Communism.** The origins and development of socialist and communist movements from pre-Marxian times to the present. C-L: Comparative Area Studies. One course. *Lerner*
- 121. The United States as a World Power: 1861-1941.** American diplomacy from the beginning of the Civil War to entry into World War II. One course. *C. Davis*
- 122. American Diplomacy and Issues of War and Peace Since Entry into World War II.** One course. *C. Davis*
- 123S. Madness and Society in Historical Perspective.** Mental illness and psychiatric treatment from antiquity to the present with special concentration on the nineteenth and twentieth centuries in Europe, America, and Russia. One course. *M. Miller*
- 124S. Slave Society in Colonial Anglo-America: The West Indies, South Carolina, and Virginia.** The development of slave-based societies and the production of staple crops for export. One course. *Gaspar*
- 125. Religion in Greece and Rome.** See C-L: Classical Studies 103. One course. *Boatwright or Rigsby*
- 126. Women in the Ancient World.** See C-L: Classical Studies 104; also C-L: Women's Studies. One course. *Boatwright*
- 127S. History and the Visual Image.** Relationships between historical study and the visual image: painting, photography, films, and television. C-L: Film and Video. One course. *Bergquist, TePaske, or Wood*
- 128. The United States and Latin America.** Economic, cultural, political, and diplomatic relationships in the twentieth century. C-L: Comparative Area Studies. One course. *Bergquist*

130. From Victorian to Corporate America, 1820-1900. One course. *S. Nathans*

131. History of Mexico and the Spanish Caribbean in the Nineteenth and Twentieth Centuries. Political, economic, and social developments in Mexico and the Spanish Caribbean with emphasis upon comparison of the Cuban and Mexican Revolutions. C-L: Comparative Area Studies. One course. *TePaske*

133. Medieval Europe, 300-1400. C-L: Medieval and Renaissance Studies. One course. *Young*

134. Medieval England. From the fifth through the fourteenth centuries. C-L: Medieval and Renaissance Studies. One course. *Young*

137. Strategies of Comparative Analysis. See C-L: Interdisciplinary Course 125; also C-L: Anthropology 125, Comparative Area Studies, Political Science 125, and Sociology 125. One course. *Staff*

138. Early Modern Germany. The interplay of religious, social, economic, and political forces in Central Europe from the eve of the Protestant Reformation through the Thirty Years War: the roles of Luther, urban society, the Peasants' War, commercial expansion, population growth, and the witch craze. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Robisheaux*

139. China Since 1949: The People's Republic. The Chinese path to communism and the communist transformation of Chinese society. C-L: Comparative Area Studies. One course. *Dirlik*

140. Medieval and Early Modern India, Pakistan, and Bangladesh. Surveys the Islamic period of South Asian history from c. 1200 A.D. to 1750 A.D. Special emphasis on the Delhi Sultanate, the Kingdom of Vijayanagara, the Rajput Confederacy, the Mughal Empire, and the Maratha before British conquest. C-L: Comparative Area Studies. One course. *Richards*

141. Imperial China. A survey course from antiquity to the modern period (eighteenth century). An exploration of social, economic, intellectual, and political themes. C-L: Comparative Area Studies. One course. *R. Davis*

142. China: Roots of Revolution. A survey of modern Chinese history with special emphasis on the nineteenth and twentieth centuries. C-L: Comparative Area Studies. One course. *Dirlik*

143. Ancient and Early Modern Japan. Japan from earliest settlement to 1868; the Heian Court, rise of the samurai, feudal society and culture, the Tokugawa age, and the Meiji Restoration. C-L: Comparative Area Studies. One course. *Gordon*

144. The Emergence of Modern Japan. Japan from Meiji to microchips. The Meiji settlement, industrialization and urban growth; political parties, social movements, and foreign policy in the imperial era; World War II and the American occupation; economic recovery. C-L: Comparative Area Studies. One course. *Gordon*

145, 146. Afro-American History. The black experience in America from slavery to the present. C-L: Afro-American Studies 145, 146. One course each. *Gavins*

149. Military History. War, politics, and technology. One course. *Roland*

150. Canadian and American Agrarian Movements. A comparative study of the impact of industrialization on the agricultural societies of Canada and the United States, 1880-1935. C-L: Canadian Studies. One course. *Goodwyn*

152. The Modern Middle East. The historical development of the Middle East in the nineteenth and twentieth centuries. The emergence of nation-states in the region following World War I. One course. *Y. Miller*

153S. The Insurgent South. C-L: Interdisciplinary Course 153S. One course. *Goodwyn*

154. The Rise and Fall of European Liberalism, 1688-1945. Development and decline of European liberalism and its impact on European societies and political institutions. One course. *Reddy*

156. America in International Affairs, 1689-1861. The diplomacy of the Colonial Revolutionary and early national periods. One course. *C. Davis*

157, 158. The Rise of Modern Science. The development of science and medicine, with attention to cultural and social influences upon science. 157: through Newton. 158: eighteenth to twentieth centuries. One course each. *Mauskopf*

159S. The Palestine Problem and United States Public Policy. See C-L: Public Policy Studies 175S; also C-L: Comparative Area Studies. One course. *Kuniholm*

160. The United States from the New Deal to the Present. C-L: Women's Studies. One course. *Chafe*

161, 162. History of Modern Russia. 161: origins of Kievan Russia in the ninth century through the reign of Catherine the Great (1762-1796), concentrating on the formation of the imperial state, class elites, and psychological interpretations of the rulers. 162: nineteenth and early twentieth centuries to the death of Lenin, stressing the opposition movements in society. C-L: Comparative Area Studies. One course each. *M. Miller*

163. Foundations of Chinese Civilization. (Taught in China.) See C-L: Anthropology 163; also C-L: Comparative Area Studies. One course. *Staff*

164. India, Pakistan, and Bangladesh: 1750 to the Present. Social and economic impact of Western rule, development of nationalism and independence. C-L: Comparative Area Studies. One course. *Richards*

167S. United States and Canadian Constitutional Issues. A comparative study of the development of federalism. C-L: Canadian Studies and Comparative Area Studies. One course. *Cahow*

168S. The Atlantic Slave Trade. The development of the slave trade from the fifteenth century to its abolition in the nineteenth century; organization and mechanics, impact on Europe, Africa, and the Americas. C-L: Comparative Area Studies. One course. *Gaspar*

169S, 170S. The Social History of American Women. C-L: Women's Studies. One course each. *A. Scott*

171. A History of Women in Europe. Women in Europe since medieval times, with particular attention to economic, social, and intellectual experience. C-L: Comparative Area Studies and Women's Studies. One course. *Neuschel*

173. History of Spain from Late Medieval Times to the Present. Development of the Spanish nation-state from the times of Ferdinand and Isabella, Charles V, and Philip II to the Franco regime and its aftermath. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *TePaske*

174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. The pre-Columbian cultures, European conquest and its effects on the Amerindian peoples, and development of the Spanish and Portuguese Empires to the wars of independence, with special emphasis upon colonial institutions and socio-economic developments. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *TePaske*

175S. The Southern Plantation as Historical Laboratory: Odyssey in Black and White, 1770-1970. Readings and discussion on the plantation as a microcosm of South-

ern social history since 1770, emphasizing the parallel evolution of black and white communities, families, economies, cultures, perceptions, and power struggles. One course. *S. Nathans*

176S. The Southern Plantation as Historical Laboratory: Research Seminar. Original research projects and seminar discussions on the social history of the plantation and its black and white inhabitants, relying on manuscripts at Duke and at the Southern Historical Collection, statistical records, the architectural legacy, literary and oral testimony, material culture, and folklore. One course. *S. Nathans*

177. Modern Latin America. A survey of nineteenth- and twentieth-century economic, social, and cultural change. C-L: Comparative Area Studies. One course. *Bergquist*

179. History of South Africa, 1600-1960. The relationships among South Africa's racial and cultural communities, with special attention to economic and political developments within each community and the impact of those developments on their mutual interactions. C-L: Comparative Area Studies. One course. *Ewald*

180. The Soviet Experience. A survey of the history of Russia and the Soviet Union from the eve of the Revolution to the present day with particular emphasis on political, social, and cultural change and continuity. Not open to students who have had History 262. C-L: Comparative Area Studies. One course. *Lerner*

181. Alexander the Great. See C-L: Classical Studies 135. One course. *Oates*

182. Politics and Culture in Renaissance Florence. (Taught in summer program in Italy.) C-L: Comparative Area Studies. One course. *Witt*

183S. Canada from the French Settlement. Problems in the development of Canada and its provinces. C-L: Canadian Studies and Comparative Area Studies. One course. *Cahow*

184. An Introduction to Canada and Canadian Issues. See C-L: Interdisciplinary Course 184; also C-L: Canadian Studies, Comparative Area Studies, Economics 184, Political Science 184, and Sociology 184. One course. *Cahow*

185. American Diplomacy from the Kennedy Administration to the Present. C-L: Public Policy Studies 185. One course. *C. Davis or Kuniholm*

186. Marxism and Society. See C-L: Anthropology 139; also C-L: Education 139, Interdisciplinary Course 139, and Sociology 139. One course. *Fox or J. Wilson*

187. History and Religions of North Africa. See C-L: Religion 164; also C-L: Comparative Area Studies and Interdisciplinary Course 164. One course. *Lawrence*

188. German History from 1870 to 1970. Analysis of the major historical, social, economic, and cultural developments of German history, from the founding of the German Reich through the post World War II period. Taught in German for Duke students by a faculty member of the Free University of Berlin. One course. *Staff*

193, 194. Introduction to the Civilizations of Southern Asia. See C-L: Interdisciplinary Course 101, 102; also C-L: Anthropology 101, 102; Comparative Area Studies; and Religion 160, 161. One course each. *Fox and staff*

199. The History of Women in Science and Medicine. The history of scientific and medical theories about women and an analysis of women as participants in the evolution of science and medicine. One course. *Green*

SMALL GROUP LEARNING EXPERIENCES

Independent Study

Independent study is usually undertaken by students concurrently with a course or with an instructor with whom they have had a course. Students should submit to the instructor in writing a detailed description of intent in the study. Both the instructor's consent and approval of the Director of Undergraduate Studies are required for enrollment.

191, 192. Independent Study. One course each. *Staff*

Undergraduate Seminars

See also History 21S, 22S, 49S, 91S, 92S, 93S, 123S, 124S, 127S, 153S, 159S, 167S, 168S, 170S, 175S, 176S, 183S.

165S, 166S. Seminars in Selected Topics. Course content determined by instructor. Prerequisite: consent of instructor. One course each. *Staff*

195S, 196S. Seminars for Undergraduates. Opportunities for historical investigation of significant problems. Juniors as well as seniors may apply for admission to these courses and are urged to do so if they expect to be candidates for graduation with distinction in history or if they expect to practice-teach in their senior year. Open to majors and nonmajors. The sections are listed below. Most sections are offered for year-long study and carry two course credits. Sections 25 through 32 are offered only for one semester and carry one course credit. One course each. *Staff*

1. Renaissance Intellectual History, 1300 to 1600. C-L: Medieval and Renaissance Studies. *Witt*
2. Twentieth-Century Europe. *Colton*
3. Problems in the Social and Intellectual History of the United States. *Holley*
4. Medicine and Society in America. *English*
5. The Age of the American Revolution. *Wood*
6. The Era of the American Civil War, 1820-1900. *Durden*
7. Socialism and Revolution in East Asia. C-L: Comparative Area Studies. *Dirlik*
11. Problems in Modern British History. *Cell*
12. Europe and the World since 1914. *W. Scott*
13. Problems in Early Modern English History. C-L: Medieval and Renaissance Studies. *Herrup*
15. The Emergence of Industrial Society in Western Europe, 1780-1914. *Reddy*
16. Science and Society. *Mauskopf*
17. Problems in the History of Modern Japan. C-L: Comparative Area Studies. *Gordon*
18. Problems in the History of Russia before 1917. C-L: Comparative Area Studies. *Lerner or Miller*
19. Social Conflict and Political Change in the United States, 1789-1860. *S. Nathans*
20. Comparative Problems in Early Modern European History. C-L: Medieval and Renaissance Studies. *Neuschel or Robisheaux*
21. Problems in Indian History. C-L: Comparative Area Studies. *Richards*
22. Problems in Latin American History. C-L: Comparative Area Studies. *Bergquist or TePaske*
23. Issues in the History of Tropical Africa. C-L: Comparative Area Studies. *Ewald*
24. Problems in Recent United States Diplomatic History. *C. Davis*
25. Problems in Twentieth-Century American History. *Chafe*
26. Popular Protest in British Society, 1750-1914. *Staff*
27. Origins of the Cold War. *Kuniholm*
28. The Black Death and the Crisis of Late Medieval Europe. C-L: Medieval and Renaissance Studies. *Robisheaux*
29. Problems in the History of Women in Europe. *Neuschel*
30. Traditions in China and the West. C-L: Comparative Area Studies. *R. Davis*
31. Issues in Third World Women's History. *Ewald*
32. Crime and Society: Changing Definitions of Criminality in England and America. *Herrup*
33. History of the Working Class in America. *Keyssar*
34. Comparative Race Relations: South Africa and America. *Cell*

197S-198S. Senior Honors Seminar. Designed to introduce qualified students to advanced methods of historical research and writing and to the appraisal of critical histor-

ical issues. Open only to seniors, but not restricted to candidates for graduation with distinction. This course, when taken by a history major, is accompanied by either a year-long 195S-196S seminar or two courses at the 200 level. In unusual circumstances, with consent of the instructor, coordinator of the senior honors seminar, and Director of Undergraduate Studies, 191-192 may replace the two courses of 195S-196S seminars or the two courses at the 200 level. Two courses. *Staff*

ADVANCED COURSES (FOR SENIORS AND GRADUATES)

Students may receive credit for either semester of a hyphenated course at the 200 level without taking the other semester if they obtain written consent from the instructor.

201S. The Russian Intelligentsia and the Origins of the Revolution. Origin and dynamics of the Russian revolutionary movement, the intelligentsia, and the emergence of the labor movement. C-L: Comparative Area Studies. One course. *M. Miller*

202S. The Russian Revolution. An analysis of the Bolshevik seizure of power in 1917 and the establishment of a revolutionary society and state during the 1920s. C-L: Comparative Area Studies. One course. *M. Miller*

207, 208. Constitutional History of Britain: The Rise of the Common Law. The origins and development of Britain's law and constitution, related to its setting in a changing society. 207 cross-listed with Medieval and Renaissance Studies. C-L: Comparative Area Studies. One course each. *Herrup*

212. The American Indian in the Revolutionary Era, 1760-1800. One course. *Wood*

215-216. The Diplomatic History of the United States. Not open to undergraduates who have had History 121, 122. C-L: Canadian Studies. Two courses. *C. Davis*

217S, 218S. Western Europe in the Twentieth Century. Selected topics in political and social history: Europe in 1900; the impact of two world wars; the social politics of the Great Depression; Fascism and Nazism; economic recovery and changes after 1945. C-L: Comparative Area Studies. One course each. *Colton*

219S, 220S. History of Science and Technology. The interaction of science and technology in the Western world from earliest times to the present. One course each. *Mauskopf and Roland*

222. Problems in the Intellectual History of the European Renaissance and Reformation. Prerequisites: History 104 and reading knowledge of German, French, or Italian. C-L: Medieval and Renaissance Studies. One course. *Witt*

226. Topics in the Labor History of the United States. One course. *Keyssar*

229S, 230S. Revolution in Modern Europe, 1789-1919. The French Revolution, the revolutions of 1830 and 1848, the Paris Commune, and the Russian and German revolutions of 1917 and 1918-1919. Emphasis on the evolution of historians' efforts at explanation of revolutions and on the relationship between social and political change. C-L: Comparative Area Studies. One course each. *Reddy*

233S. Slave Resistance and Social Control in New World Societies. The operation of slave societies in the Americas from the sixteenth to the nineteenth centuries focusing on master-slave relations and slave resistance. One course. *Gaspar*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Anthropology 234S, Comparative Area Studies, Interdisciplinary Course 234S, and Sociology 234S. One course. *Bergquist, Fox, Gereffi, or Smith*

237S. Europe in the Early Middle Ages. C-L: Medieval and Renaissance Studies. One course. *Young*

238S. Europe in the High Middle Ages. C-L: Medieval and Renaissance Studies. One course. *Young*

239S. History of Socialism and Communism. Problems in the origins and development of socialist and communist movements. C-L: Comparative Area Studies. One course. *Lerner*

241-242. United States Constitutional History. 241: to 1865; 242: 1865 to present. Two courses. *Cahow*

245, 246. Social and Intellectual History of China. C-L: Comparative Area Studies. One course each. *R. Davis and Dirlik*

249-250. Social and Intellectual History of the United States. The interplay of ideas and social practice through the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. Two courses. *Holley*

253S, 254S. European Diplomatic History, 1871-1945. Origins of the First and Second World Wars, the diplomacy of the wars, and the peace settlements which followed them. C-L: Comparative Area Studies. One course each. *W. Scott*

260. Fifth and Fourth Century Greece. See C-L: Classical Studies 222. One course. *Oates or Rigsby*

261. Alexander and the Hellenistic World. See C-L: Classical Studies 223. One course. *Oates*

262. Problems in Soviet History. Studies in the background of the Revolution of 1917 and the history and politics of the Soviet state. C-L: Comparative Area Studies. One course. *Lerner*

263. The Roman Republic. See C-L: Classical Studies 224. One course. *Boatwright or Rigsby*

264. The Roman Empire. See C-L: Classical Studies 225. One course. *Boatwright*

265S. Problems in Modern Latin American History. C-L: Comparative Area Studies. One course. *Bergquist*

267S, 268S. From Medieval to Early Modern England. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course each. *Herrup*

269S-270S. British History, Seventeenth Century to the Present. Historiography of social structure and social change: English Revolution, party, the Industrial Revolution, class and class consciousness, Victorianism, and the impact of war in the twentieth century. C-L: Comparative Area Studies. Two courses. *Cell*

273S, 274S. Topics in the History of Science. Critical stages in the evolution of scientific thought. One course each. *Mauskopf*

277S. The Coming of the Civil War in the United States, 1820-1861. One course. *Durden*

278S. The Civil War in the United States and Its Aftermath, 1861-1900. One course. *Durden*

279, 280. Health, Healing, and History. The development of medicine within the broader cultural context from prehistory to the twentieth century. One course each. *English*

282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Canadian Studies, Comparative Area Studies, Political Science 282S, and Sociology 282S. One course. *Cahow*

284S. Feminist Theory and the Social Sciences. History majors should consult with the department about whether this course meets senior seminar requirements for the major. See C-L: Interdisciplinary Course 284S. One course. *Chafe, Neuschel, O'Rand, or C. Smith*

285S, 286S. Oral History. Research on race relations and civil rights in the United States in the twentieth century using techniques of oral history. Prerequisite: consent of instructor. One course each. *Chafe and Goodwyn*

Upperclassmen-Graduate Seminars

See History 201S, 202S, 217S, 218S, 219S, 220S, 229S, 230S, 231S, 232S, 233S, 234S, 237S, 238S, 239S, 253S, 254S, 265S, 267S, 268S, 269S-270S, 273S, 274S, 277S, 278S, 282S, 284S, 285S, 286S.

COURSES CURRENTLY UNSCHEDULED

101K. Topics in Pre-Modern Chinese History

110. Labor Movements in the Americas

118. Science in the Twentieth Century

129. Experiment in Republicanism: The United States, 1787-1860

132. Major South American Nations, 1850 to the Present

147. History of Weapons

151. History of Technology

155. Modern Mexico

172A. Contemporary Science: Issues and Challenges

172B. Contemporary Technology: Issues and Challenges

178. American Diplomacy during World War II and the Early Cold War: 1939-1961

189. The Americas: A Survey of the Forces Shaping the Hemisphere

221. Problems in the Economic and Social History of Europe, 1200-1700

227-228. Recent United States History: Major Political and Social Movements

231S, 232S. Problems in the History of Spain and the Spanish Empire

235. The Antebellum South

236. The Reconstruction Era

243-244. Marxism and History

247. History of Modern India and Pakistan, 1707-1857

248. History of Modern India and Pakistan, 1857 to the Present

259. Archaic Greece

266. Late Antiquity

HISTORY COURSES BY FIELDS

History courses for undergraduates are offered in five fields, as noted below; students majoring in the department must complete at least one course in each of three fields. A course listed in two fields may be used to meet the requirement in either of those fields, but may not be used for both.

Africa, Asia, Canada, Caribbean, Latin America, Russia. History 25, 26, 75, 76, 101G, 102G, 101K, 105, 109, 110, 115, 120, 124S, 128, 131, 132, 139, 140, 141, 142, 143, 144, 150, 152, 159S, 161, 162, 163, 164, 167S, 168S, 174, 177, 179, 180, 183S, 184, 186, 187, 189; 193, 194; 195S-196S sections 7, 17, 18, 21, 22, 23, 30, 31, 34; 201S, 202S, 234S, 239S, 247, 248, 262, 265S, 282S.

Ancient, Medieval and Renaissance. History 23, 25, 53, 54, 100, 103, 104, 107, 117, 125, 126, 133, 134, 138, 152, 173, 181, 182; 195S-196S sections 1, 13, 28; 221, 222, 237S, 238S, 260, 261, 263, 264, 267S.

Medicine, Military, Science, Technology. History 100, 101H, 118, 123S, 127S, 147, 148, 149, 151, 157, 158, 172A, 172B, 199; 195S-196S sections 4, 16; 213, 219S, 220S, 273, 274.

Modern Europe. History 21, 21S, 22, 22S, 23, 49S, 101C, 107, 108, 117, 119, 120, 135, 136, 137, 138, 154, 171, 173, 180, 182, 188; 195S-196S sections 2, 11, 12, 20, 26, 28, 29; 207, 208, 217S, 218S, 221, 229S, 230S, 253S, 254S, 268S, 269S, 270S.

United States. History 91, 91S, 92, 92S, 93S, 110, 111, 112, 113, 121, 122, 124S, 128, 129, 130, 145, 146, 150, 153S, 159S, 160, 168S, 169S, 170S, 175S, 176S, 185; 195S-196S sections 3, 5, 6, 19, 24, 25, 27, 33; 212, 215-216, 229S, 230S, 231S, 232S, 241-242, 249-250, 277S, 278S, 285S, 286S.

THE MAJOR

Introductory Courses. Two introductory courses in history (21-22, 21S-22S, 23, 25-26, 53-54, 75-76, 91-92, 91S-92S, 93S).

Major Requirements. Eight courses in history including (1) at least two introductory courses, (2) at least one course in each of three out of the five fields described above, (3) two courses in an undergraduate seminar (195S-196S) or on the 200 level. Students are urged to register for two consecutive courses at this level, but may take two single semester courses with consent of both instructors. Students wishing to take advanced courses in a field are advised to elect the introductory course in that field.

Advanced Placement Credit. Two of the eight courses needed for the major may be fulfilled by advanced placement credits. If two additional advanced placement credits have been granted they may be applied toward the thirty-two credits needed for graduation, but may not be applied to the history major.

Foreign Languages. Majors interested in a particular area of study benefit from knowledge of the language of that area. Majors who contemplate graduate work are reminded of the requirement of a reading knowledge of one or two foreign languages.

Majors Planning to Teach. Majors who plan to teach in secondary schools should consult an adviser in education. Rising juniors who intend to practice-teach in the senior year should take the 195S-196S or 197S-198S seminars or 200-level courses as juniors.

Honors. Any student who is qualified (see the section on honors in this bulletin) may apply to the Director of Undergraduate Studies for permission to undertake work leading to a degree with distinction in history.

House Courses (HC)

See the chapter "Academic Procedures and Information" for information on house courses.

Human Development Program

Professor Maddox, *Director*

A certificate, but not a major, is available in this program.

The goal of this interdisciplinary program is to broaden and enhance the perspectives of students interested in human development. The program seeks to foster an understanding and appreciation of how biological, psychosocial, and cultural factors act together in development throughout the life course; highlight the ways in which different disciplines conceptualize and study development; demonstrate the complementarity of disciplinary perspectives; and facilitate dialogue among faculty and students, illustrating the complementarity of and necessity for multidisciplinary perspectives.

Achievement of the program's goal is facilitated by an integrated curriculum of required and elective courses, a research apprenticeship, a lecture series, and other special events. An active advisory procedure assists students in planning learning opportunities. A certificate is available for students who complete program requirements. Participation in selective parts of the program and in the advisory system, however, is available to all undergraduates whether or not they seek the certificate.

The curriculum includes six courses, completion of which is required for the program certificate.

Interdisciplinary Course 124. Human Development. C-L: Psychology 124 and Sociology 124. *Maddox*
Either Psychology 159S (Biological Psychology of Human Development, *Thompson*) or Interdisciplinary
Course 180, C-L: Psychology 130 and Sociology 169 (Psychosocial Aspects of Human Development,
Martin Lakin and Maddox)

Interdisciplinary Course 190. Research Apprenticeship in Human Development. *Staff*

Interdisciplinary Course 191S. Senior Seminar in Human Development. *Staff*

Two elective courses chosen from an illustrative list of biological, psychological, and social scientific courses
affiliated with the program published in the program brochure.

The research apprenticeship arranged through the program and the related senior seminar would ordinarily be available only to students seeking the program certificate. Other components of the program are available to all undergraduates.

Interdisciplinary Courses (IDC)

21S. Freshman Seminar: Topics in Medieval Studies. Topics vary according to instructor: perspectives from history, literature, religion, philosophy, and the arts. C-L: Medieval and Renaissance Studies. One course. *Staff*

22S. Freshman Seminar: Topics in Renaissance Studies. Topics vary according to instructor: perspectives from history, literature, religion, philosophy, and the arts. C-L: Medieval and Renaissance Studies. One course. *Staff*

101, 102. Introduction to the Civilizations of Southern Asia. Hindu, Islamic, and Buddhist foundations; impact of the West; and emergence of the modern nation-states of southern Asia. 101: traditional Hindu civilization and Islamic impact on southern Asia. 102: Western influences and the development of modern societies and states in southern Asia. C-L: Anthropology 101, 102; Comparative Area Studies; History 193, 194; and Religion 160, 161. One course each. *Fox and staff*

103. An Introduction to Women's Studies. Gender roles, their place in American culture, and the twentieth-century feminist movement. Use of the perspectives of the social sciences, the natural sciences, and the humanities. Emphasis on integrating the study of women, women's history, experience, and modes of expression into the traditional disciplines. C-L: Women's Studies. One course. *J. O'Barr and staff*

104. Public Policy and the Marine Environment. Economic, legal, medical, political, social, and scientific viewpoints on the effect of human society on the marine environment; special emphasis on coastal North Carolina. Lectures and projects. One course. *Costlow*

106. Introduction to the Study of Literature and Society. See C-L: Comparative Literature 101; also C-L: Comparative Area Studies. One course. *Willis*

107S, 108S. Science, Technology, and Human Values. Open to juniors and seniors in the Science, Technology, and Human Values Program and to other seniors if space is available. Credit by arrangement: the pair, or either 107S or 108S, may be taken for one course credit. Two half courses or one course. Prerequisite: consent of instructor. Variable credit. *Vesilind and staff*

109. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, History 109, Political Science 160, Religion 156, and Sociology 175. One course. *Staff*

111. Introduction to Linguistics. See C-L: Anthropology 107; also C-L: English 111 and Linguistics. One course. *Staff*

112S, 113S. Topics in Science, Technology, and Human Values. Six five-week segments offered sequentially over the fall and spring semesters by faculty of the Program in Science, Technology, and Human Values. Credit for 112S or 113S is awarded for com-

pletion of three to five segments within a single academic year; credit for 112S and 113S for completion of six segments. Students who expect to take three to five segments only are encouraged to register for 112S. One course each. *Staff*

114. Introduction to Medieval Studies. A survey of historical, literary, philosophical, and art historical materials introducing medieval culture and the methods developed for its study. One course. *Solterer, Witt, and staff*

115. Introduction to Renaissance Studies. A survey of historical, literary, philosophical, and art historical materials introducing Renaissance culture and the methods developed for its study. One course. *Robisheaux, Schwartz, and staff*

119. Current Topics in Linguistics. See C-L: Anthropology 112; also C-L: English 119 and Linguistics. One course. *Staff*

120. Perspectives on Food and Hunger. Issues of food and hunger from an interdisciplinary perspective. Lectures present analytic approaches from the natural sciences, social sciences, and the humanities. Pass/fail grading only. C-L: Comparative Area Studies. Half course. *Johns*

120A. Perspectives on Food and Hunger. See Interdisciplinary Course 120. Lectures, weekly discussion meetings, and individual research. C-L: Comparative Area Studies and Political Science 176A. One course. *Johns*

120B. Perspectives on Food and Hunger. See Interdisciplinary Course 120. Lectures, community internship project, and discussion meetings. C-L: Comparative Area Studies and Political Science 176B. One course. *Johns*

124. Human Development. Biological, behavioral, and cultural perspectives and approaches. Evaluation of competing paradigms. Taught by multidisciplinary team. Especially for sophomores. C-L: Human Development, Psychology 124, and Sociology 124. One course. *Maddox and staff*

125. Strategies of Comparative Analysis. Comparative research and analysis in the social sciences and the humanities: strengths and weaknesses of cross-cultural comparison as developed by sociologists, historians, political scientists, anthropologists, and specialists in comparative literature and religion. C-L: Anthropology 125, Comparative Area Studies, History 137, Political Science 125, and Sociology 125. One course. *Staff*

139. Marxism and Society. See C-L: Anthropology 139; also C-L: Education 139, History 186, and Sociology 139. One course. *Fox or J. Wilson*

140. The Great Mother: Archetype or Stereotype? See C-L: Comparative Literature 140; also C-L: Comparative Area Studies and Women's Studies. One course. *Wang*

150S. Comparative Area Studies Senior Seminar. Open to seniors majoring in Comparative Area Studies and to other seniors if space is available. Prerequisite: consent of instructor. One course. *Gordon*

153S. The Insurgent South. C-L: History 153S. One course. *Goodwyn*

155. Comparative Perspectives on Literature and Social Change: From Plantation to City. See C-L: Comparative Literature 155; also C-L: Comparative Area Studies. One course. *Willis*

160S. Topics in Medieval and Renaissance Studies. Interdisciplinary perspectives from the arts, history, literature, philosophy, and religion. For juniors and seniors and Medieval and Renaissance Studies majors, or with consent of instructor. Prerequisite: one course in Medieval and/or Renaissance periods. C-L: Medieval and Renaissance Studies. One course. *Staff*

162, 163. Introduction to Islamic Civilization. Extensive survey of Muslim peoples and institutions. 162: the Middle Eastern origins and cultural attainments of medieval Islam. 163: modern developments and global features of the Islamic world. C-L: Anthropology 147, 148; Comparative Area Studies; History 101G, 102G; and Religion 162, 163. One course each. *Lawrence and staff*

164. History and Religions of North Africa. See C-L: Religion 164; also C-L: Comparative Area Studies and History 187. One course. *Lawrence*

180. Psychosocial Aspects of Human Development. See C-L: Psychology 130; also C-L: Human Development and Sociology 169. One course. *Martin Lakin and Maddox*

182. Media in Comparative Perspective. Impact of mass media outside the United States. Cross-national comparisons of media content, audiences, and control. Relationships of governments to media and media policies. International flow of media materials and their cross-national impact. C-L: Comparative Area Studies, Political Science 180, and Sociology 182. One course. *Paletz or Smith*

184. An Introduction to Canada and Canadian Issues. A survey of the main geographic, historical, economic, governmental, and political facets that have shaped modern Canada and an examination of persistent and current issues facing the Canadian nation. C-L: Canadian Studies, Comparative Area Studies, Economics 184, History 184, Political Science 184, and Sociology 184. One course. *Cahow*

186. Research Internship in Primatology. Part of the Undergraduate Program in Primatology. Supervised work either in a laboratory or at the Primate Center. Prerequisite: consent of instructor. C-L: Anthropology 186. One course. *Staff*

187S. Senior Seminar in Primatology. Part of the Undergraduate Program in Primatology. Prerequisite: consent of instructor. C-L: Anthropology 187S. One course. *Staff*

188S. The Diaghilev Ballet, 1909-1929. Prerequisite: junior or senior standing or consent of instructor. See C-L: Dance 188S; also C-L: Institute of the Arts 121S. One course. *Dickinson and staff*

190. Research Apprenticeship in Human Development. Part of the Undergraduate Program in Human Development. Supervised work may be in a laboratory, project, or organizational setting. Prerequisite: consent of instructor. C-L: Human Development. One course. *Staff*

191S. Senior Seminar in Human Development. Part of the Undergraduate Program in Human Development. Prerequisite: consent of instructor. C-L: Human Development. One course. *Thompson and staff*

195S. Senior Seminar in Women's Studies. Original research project in feminist scholarship, applying multidisciplinary perspectives. For Women's Studies Program certificate earners. Prerequisite: consent of instructor. One course. *J. O'Barr and staff*

200. Advanced Neuroscience I. Basic neuroanatomy and neurophysiology, physiology of the neuron and neural networks, neurotransmitter functions, sensory and motor systems. Prerequisite: Psychology 103. C-L: Psychology 200 and Zoology 200. One course. *Cant and McClay*

201. Advanced Neuroscience II. Integrative activities of the nervous system; sensory-motor relationships, neuroendocrine relationships, emotion and motivation, sleep, learning and memory, diseases of the nervous system and their psychological correlates. Prerequisite: Interdisciplinary Course 200, Psychology 200, or Zoology 200. C-L: Psychology 201. One course. *R. Erickson and W. G. Hall*

211S. History of Feminist Thought. The intellectual history of feminist thought and

an analysis of the sex/gender system from medieval through modern times. Examination of a number of classical philosophical, sociological, and literary texts. Open to advanced undergraduates with instructor's consent and to all graduate students. C-L: Women's Studies. One course. *Neuschel, J. O'Barr, or Pope*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Anthropology 234S, Comparative Area Studies, History 234S, and Sociology 234S. One course. *Bergquist, Fox, Gereffi, or Smith*

282S. Canada. A research seminar for advanced students familiar with Canada. Topics vary each semester; recent perspectives have included nationalism, Canadian-American relations, regionalism in the Maritimes and the West, and cross-border environmental issues, among others. C-L: Anthropology 282S, Canadian Studies, Comparative Area Studies, History 282S, Political Science 282S, and Sociology 282S. One course. *Cahow*

283S. Feminist Theory and the Humanities. Beliefs about gender in the assumptions, methods, and issues of mainstream scholarship in traditional disciplines of the humanities. The impact of gender-related social and institutional circumstances on those disciplines. C-L: English 283S, Religion 269S, and Women's Studies. One course. *Clark, Orr, Pope, or Tompkins*

284S. Feminist Theory and the Social Sciences. Examination of feminist modes of inquiry in the social sciences. The relationship of gender in economic, political, social and cultural systems and the resulting methodological shifts in social science disciplines. C-L: History 284S. One course. *Chafe, Neuschel, O'Rand, C. Smith, or Spenner*

COURSES CURRENTLY UNSCHEDULED

99. Perspectives in Archaeology

105. Austrian Culture

170. Romanticism in the Arts

189. The Americas: A Survey of the Forces Shaping the Hemisphere

Italian

For courses in Italian, see Romance Languages.

Japanese

For courses in Japanese, see Asian and African Languages.

Judaic Studies Program (Center for Judaic Studies)

Professor E. Meyers, (religion), *Director*; Professor Wintermute (religion); Associate Professors Alt (Germanic languages and literature), Bailey (Divinity School), Bland (religion), and C. Meyers (religion)

A program in Judaic studies may be taken as part of a major in religion or as a supplement to any other major. It may also be taken under Program II. Students are eligible for a certificate in Judaic studies after completing four courses in the program.

For descriptions of the courses consult the listings under the specified departments.

German

181, 182. Elementary Yiddish. *Alt*

Hebrew

1, 2. Elementary Modern Hebrew. *Staff*

63, 64. Intermediate Modern Hebrew. *Staff*
191, 192, 193, 194. Independent Study. *Staff*

Religion

- 50. The Old Testament. *C. Meyers, E. Meyers, Peters, or Wintermute*
- 51. Introduction to Judaic Civilization. *Bland or E. Meyers*
- 101. Selected Studies in the Bible: Prophets. *Staff*
- 102. Selected Studies in the Bible: Writings. *Staff*
- 105. Theology of the Old Testament. *Wintermute*
- 109. Women in the Biblical Tradition: Image and Role. *C. Meyers*
- 110. Archaeology and Art of the Biblical World. *C. Meyers or E. Meyers*
- 115-116. Introduction to Biblical Hebrew. *Bailey*
- 131D. Principles of Archaeological Investigation. *C. Meyers or E. Meyers*
- 132D. Palestine in Late Antiquity. *E. Meyers*
- 133. Foundations of Post-Biblical Judaism. *E. Meyers*
- 134. Jewish Mysticism. *Bland*
- 136. Contemporary Jewish Thought. *Bland or E. Meyers*
- 195B, 196B. Junior-Senior Seminars. *Staff*
- 207, 208. Intermediate Biblical Hebrew. *Staff*
- 220. Rabbinic Hebrew. *E. Meyers or staff*
- 221. Readings in Hebrew Biblical Commentaries. *Bland*
- 238. Jewish Responses to Christianity. *Bland*
- 243. Archaeology of Palestine in Biblical Times. *C. Meyers*
- 244. Archaeology of Palestine in Hellenistic-Roman Times. *E. Meyers*

Opportunities for independent study are offered in the Department of Religion under 191, 192, 193, 194. Procedures for registration and applications are available in 118 Gray Building.

Special attention is directed to those courses in New Testament which are relevant to the study of Rabbinic Judaism, i.e., Religion 106, 107, 108, and 111. A list of appropriate courses at the University of North Carolina at Chapel Hill is available in 230C Gray Building, Duke University, and in 101 Saunders Hall, University of North Carolina, Chapel Hill and may be taken under the rubric of the Cooperative Program in Judaic Studies.

Korean

For courses in Korean, see Asian and African Languages.

Latin

For courses in Latin, see Classical Studies.

Linguistics Courses

Students interested in the study of language as part of their undergraduate program or as preparation for graduate work in linguistics should consult the instructors of the courses listed below or Associate Professor Butters, Chairman, Committee on Linguistics, 307 Allen Building. Students may concentrate in linguistics through Program II. For descriptions of the following courses see the listings of the specified departments:

Anthropology

- 107. Introduction to Linguistics. *Staff*
- 112. Current Topics in Linguistics. *Staff*
- 116. Language, Ethnicity, and New Nations. *Apte*
- 118S. The Language of Advertising. *O'Barr*
- 119. Language, Culture, and Society. *Apte or Weller*
- 211S. Ethnography of Communication. *Apte, Dominguez, Fox, O'Barr, Quinn, Smith, Trouillot, or Weller*

English

- 111. Introduction to Linguistics. *Staff*
- 112. English Historical Linguistics. *Butters, Nygard, or Tetel*
- 115. Present-Day English. *Butters or Nygard*
- 118S. The Teaching of Composition, Grammar, and Literature in the Secondary School. *Page*
- 119. Current Topics in Linguistics. *Staff*
- 208. History of the English Language. *Butters or Nygard*
- 209. Present-Day English. *Butters or Nygard*

French

- 120. Language, Computers, and Formal Intelligence. *Thomas*
- 131S. French in the New World. *Hull*
- 210. The Structure of French. *Hull*
- 211. History of the French Language. *Hull*

German

- 205, 206. Middle High German. *Staff*
- 216. History of the German Language. *Staff*
- 219. Applied Linguistics. *Staff*

Interdisciplinary Courses

- 111. Introduction to Linguistics. *Staff*
- 119. Current Topics in Linguistics. *Staff*

Philosophy

- 103. Symbolic Logic. *Brandon or Posy*
- 109. Philosophy of Language. *Posy*
- 228S. Recent and Contemporary Philosophy. *Posy*
- 250S. Topics in Formal Philosophy. *Posy*

Psychology

- 134. Psychology of Language. *Day*
- 220S. Psycholinguistics. *Day*

Russian

- 150. Languages of the Soviet Union. *Pugh*
- 185S. Introduction to Slavic Linguistics. *Andrews*
- 186S. History of the Russian Language. *Pugh*

Spanish

- 119S. Structure of Spanish. *Staff*
- 210. History of the Spanish Language. *Garci-Gómez*

Management Sciences Courses (MS)

Professor Keller, *Chairman*; Professor Dickens, *Director of Undergraduate Studies*

The courses listed below are offered for undergraduates by the Fuqua School of Business. They are professional school courses and hence *do not count for the distributional requirements*. They fall within the limit of six professional school courses which may count for an undergraduate degree from Trinity College. A major is not offered to undergraduate students.

Taking a selection of these courses may be helpful in preparation for graduate education in business and law and may provide the liberal arts, science, and engineering student an advantage in placement. Students planning to take the accounting concentration in the Master of Business Administration Program of the Fuqua School of Business either following graduation or in the undergraduate-professional combination program should take Management Sciences 53 and 137 at a minimum.

The Director of Undergraduate Studies is available for consultation with undergraduates.

53. Introductory Financial Accounting. The accounting model of the firm and transactions analysis. Topics include the procedures used to process accounting data, issues in asset valuation and income determination, and financial statement analyses. Prerequisite: sophomore standing. One course. *Staff*

114. Decision Models. Development and use of models in the analysis of decision problems. Topics include linear programming and decision analysis; approaches to the solution of complex problems. Prerequisite: Mathematics 31. One course. *Staff*

120. Analysis of Organizational Behavior. Organizations and the behavior of individuals within organizations with emphasis on environmental, structural, and human factors. Topics include socialization, work motivation, decision making, leadership, power, control, small group behavior, strategy formation, organization design, organizational culture, and effects of technology. Prerequisite: junior standing. One course. *Staff*

137. Managerial Accounting. The use of accounting information by management in short-term planning, control, and decision making in business enterprises. Cost accumulation, cost analysis, cost estimation, the development of standards, introduction to budgeting, and short-run decisions. Prerequisite: Management Sciences 53. One course. *Staff*

151. Investment Management. Problems of selecting a portfolio of investments emphasizing the economics of the markets and the tools of analysis. Prerequisites: introductory statistics and junior standing. One course. *Staff*

154. Finance. Problems of financial management of the firm. Cash management, receivables management, short-term financial planning, cost of capital, capital budgeting, dividend policy, lease analysis, and long-term financial planning. Prerequisite: junior standing. One course. *Staff*

161. Marketing Management. The role of the marketing function in business; product planning, price, promotion, and distribution as elements of a total marketing mix. Formal models in solving the marketing mix problem of the firm. Prerequisite: junior standing. One course. *Staff*

171. Production and Operations Management. Issues in the design, operation, and control of the process by which goods are manufactured and services delivered. Topics include work-force management, production planning and materials management, capacity and technology choice, and the combination of operations choices into a coherent strategy. Prerequisite: junior standing. One course. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors with consent of instructor and Director of Undergraduate Studies. Variable credit. *Staff*

COURSES CURRENTLY UNSCHEDULED

199. Special Topics

The University Program in Marine Sciences

Professor Costlow (zoology), *Director*; Professor Ramus (botany), *Assistant Director for Academic Programs*; Associate Professor Forward (zoology), *Director of Undergraduate Student Affairs*; Professors Gutknecht (physiology), McClay* (zoology), Pilkey† (geology), and Searles* (botany); Associate Professors C. Bonaventura (physiology), J. Bonaventura (physiology), Johnson (geology), Sullivan (biochemistry), and Sutherland (zoology); Professor Emeritus Bookhout (zoology); Research Associate Professor Kirby-Smith (Marine Laboratory); Research Assistant Professors Brouwer and Rittschof (Marine Laboratory)

The interdisciplinary program in marine sciences provides students with a unique opportunity to live and study at the Duke University Marine Laboratory for a full academic semester—fall or spring or during the summer terms. The program emphasizes small class size, independent study, and integrated classroom, laboratory, and field experience. Students have daily access to modern scientific equipment, a specialized library, and the surrounding natural marine environment. Participation in either the spring or fall semester is possible for all majors with appropriate preparation.

The fall and spring semesters are offered primarily for juniors and seniors. Students may choose from two curricular options. Option 1: the student enrolls in two out of three courses; two seminars (a selection is generally available); and independent study. Option 2: as option 1, except that the student does not enroll in independent study, but en-

*Summer only.

†Spring only.

rolls in three courses. Students are encouraged to choose the first option during either semester.

Duke University students wishing to apply to the fall semester or the spring semester must submit an application form, together with the written approval of their faculty adviser, to the Admissions Office, Duke University Marine faculty Laboratory, Beaufort, North Carolina 28516, prior to Duke's registration period for the desired semester. Students will be notified of the action of the admissions Committee shortly thereafter. Applications received after Duke's registration period for the desired semester will be considered if space is available.

The summer curriculum, taught in three five-week terms, includes a rich assortment of courses in the natural sciences. Attention is directed to the relatively new introductory course in marine biology (Biology 10L), designed for humanities or social sciences majors at Duke.

Applications for summer courses must be accompanied by a current academic transcript (in those cases where students are applying to courses numbered 100 or higher) and should be submitted by the end of March to the address indicated above. (Thereafter, applications will be considered if space is available.) Duke students must submit the written approval of their faculty adviser.

A number of summer tuition scholarships are available on a competitive basis. Please consult the *Bulletin of Duke University: Marine Laboratory* for specific requirements and deadline dates, or contact the Admissions Office of the Marine Laboratory.

The courses below are described in the bulletin listings of the specified departments. See the most recent *Bulletin of Duke University: Marine Laboratory* and the *Duke University Official Schedule of Courses* for the current schedule of courses. For information on courses fulfilling requirements of the biology and zoology majors see the *Handbook for Zoology Majors*, available in 027 Biological Sciences.

FALL, SPRING, OR SUMMER COURSES AT BEAUFORT

Marine Biology. (Biology 10L.) For students not majoring in a natural science. One course. *Staff*

Marine Invertebrate Diversity. (Zoology 76L.) Not open to students who have taken Zoology 176L or 274L. One course. *Kirby-Smith*

Public Policy and the Marine Environment. (Interdisciplinary Course 104.) Economic, legal, medical, political, social, and scientific viewpoints on the effect of human society on the marine environment; special emphasis on coastal North Carolina. Lectures and projects. One course. *Costlow*

Marine Sediments. (Geology 109S or Geology 209S.) For Geology 209S, requirement of additional term paper. One course. *Johnson*

Behavioral Ecology. (Zoology 113L.) Prerequisite: introductory biology. One course. *Rubenstein (visiting summer faculty)*

Biological Oceanography. (Botany 114L or Zoology 114L.) Prerequisite: introductory biology. One course (spring); one and one-half courses (summer). *Ramus or staff*

Biology of Marine Macrophytes. (Botany 116L or Botany 216L.) Prerequisites: introductory biology and chemistry. One course. *Ramus*

Physiology of Marine Animals. (Zoology 150L.) Prerequisites: introductory biology and chemistry. One course. *Forward*

Organization of Marine Communities. (Zoology 169L.) Students may not receive credit for both Zoology 103L and 169L. Prerequisites: introductory biology and Mathematics 31. One course. *Sutherland*

Marine Invertebrate Zoology. (Zoology 176L.) Not open to students who have had Zoology 76L or 274L. Prerequisite: introductory biology. One and one-half courses. *Kirby-Smith*

Independent Study. (Botany 191, 192; Geology 191, 192, 195; Zoology 191, 192; Biochemistry 209, 210; Physiology 210; or as listed under the student's major department.) For junior and senior majors with consent of appropriate Director of Undergraduate Studies and supervising instructor. Credit to be arranged. *Staff*

Light in the Sea. (Botany 195S.) Half course. *Ramus*

Marine Policy. (Public Policy Studies 195S.) One course. *Orbach (visiting summer faculty)*

Beach and Island Geological Processes. (Geology 196S.) Half course. *Pilkey*

Physical Oceanography. (Geology 203.) Prerequisite: Physics 41 or 51. Half course. *Johnson*

Marine Ecology. (Zoology 203L.) Prerequisites: introductory ecology, invertebrate zoology, or marine botany (phycology); knowledge of statistics recommended. One and one-half courses. *Hay (visiting summer faculty)*

Geological Oceanography. (Geology 205S.) Not open to students who have taken Geology 206S. One course. *Johnson*

Primary Productivity in the Seas. (Botany 215L or Zoology 215L.) Prerequisites: introductory biology and chemistry. (Offered alternate summers.) One course. *Ramus*

Barrier Island Ecology. (Botany 218 or Forestry and Environmental Studies 218.) Prerequisite: a course in general ecology. One and one-half courses. *Staff*

Tropical Seaweeds. (Botany 263L.) Two-week field study. Prerequisites: Botany 145L or equivalent or consent of instructor. Half course. *Searles*

Marine Invertebrate Zoology. (Zoology 274L.) Not open to students who have had Zoology 76L or 176L except by consent of the Director of Undergraduate Studies. Prerequisite: introductory biology. One and one-half courses. *Ruppert (visiting summer faculty)*

Invertebrate Developmental Biology. (Zoology 278L.) Prerequisite: consent of instructor. One and one-half courses. *Staff*

Advanced Topics in Geology: Continental Margin Sedimentation. (Geology 295S.) Prerequisite: Geology 205S or Geology 206S or consent of instructor. One and one-half courses. *Johnson and visiting staff*

Marine Animal Navigation. (Zoology 295S.) Half course. *Forward*

Experimental Ecology of the Marine Intertidal Zone. (Zoology 296S.) Half course. *Sutherland*

Analysis of Coastal Ecosystems. (Zoology 296S.) One course. *Costlow*

The Ecology of Chemical Signals. (Zoology 296S.) Half course. *Rittschof*

COURSES CURRENTLY UNSCHEDULED

Phytoplankton. (Botany 115L.)

Plant Ecology. (Botany 147L or 247L.)

Benthic Marine Algae. (Botany 219L.)

Global Biogeochemical Cycles. (Botany 295S, 296S, or Zoology 295S, 296S.)

Chemical Oceanography. (Geology 204.)

Membrane Physiology. (Physiology 219S.)

Macromolecules, Ecology, and Evolution. (Biochemistry 245L.)

Marine Biochemistry and Genetics. (Biochemistry 266S.)

Comparative and Evolutionary Biochemistry. (Biochemistry 276.)

Marine Fishes: Selected Topics. (Zoology 296S.)

Natural History of Coastal Marine Systems. (Botany 295S or Zoology 295S.)

Mathematics (MTH)

Professor Reed, *Chairman*; Associate Professor Lawler, *Director of Undergraduate Studies*; Instructor Blake, *Supervisor of Freshman Instruction*; Professors Allard, Beale, Bryant, Griffiths, Rose, Schaeffer, Shoenfield, Warner, and Weisfeld; Associate Professors Burdick, R. Hodel, Kitchen, Kraines, Moore, Morrison, Pardon, Scoville, Smith, Sylvester, and Venakides; Assistant Professors Cheney, Gardner, Nance, Saper, Schoen, and Stern; Professors Emeriti Carlitz, Dressel, Elliott, Hickson, Murray, and Roberts; Adjunct Professor Chandra; Visiting Assistant Professors Aktosun, Delillo, Edelstein-Keshet, Kennedy, and Roy; Instructor Bookman; Part-time Instructors M. Hodel and Sager; Lecturer Schommer

A major is available in this department.

9-10. Preparatory and Precalculus Mathematics. A two-semester skills course for students who need to review topics in high school mathematics while covering the material in Mathematics 19. Students whose mathematics SAT scores are 500 or below, or whose CEB Mathematics Level I or II Achievement Test scores are 480 or below, need this two-semester course before taking Mathematics 31. No credit for Mathematics 9 without successful completion of Mathematics 10. Not open to students who take Mathematics 19. Prerequisite: for 10, Mathematics 9. One course. *Staff*

19. Precalculus Mathematics. Selected topics in algebra, trigonometry, and analytic geometry. Students with achievement scores in mathematics below 550 need this skills course before taking Mathematics 31. Not open to students who take Mathematics 10. Prerequisite: two units of college preparatory mathematics. One course. *Staff*

31. Introductory Calculus I. Functions, limits, continuity, trigonometric functions, techniques and applications of differentiation, indefinite and definite integrals, the fundamental theorem. One course. *Staff*

31X, 32X. Introductory Honors Calculus I and II. Similar to Mathematics 31 and 32, but faster paced and more challenging. Open to students who score at least 750 on the SAT Mathematics Aptitude Test. One course each. *Staff*

32. Introductory Calculus II. Transcendental functions, techniques and applications of integration, indeterminate forms, improper integrals, infinite series. Not open to students who have had Mathematics 34, 36, or 41. Prerequisite: Mathematics 31 or 33. One course. *Staff*

33, 34. Introductory Calculus with Digital Computation. Same as 31, 32 but these courses meet one additional hour per week to discuss the solution of calculus problems using the computer. No programming experience required. Prerequisites: for 34, Mathematics 33 or 31 and consent of instructor. One course each. *Staff*

41. One Variable Calculus. This course meets four times a week, quickly reviews differential calculus, and then covers integral calculus and infinite series. Designed for



freshmen who have had a year of calculus in high school and have Mathematics SAT scores of 650 or above. Not open to students who have had Mathematics 32, 34, or 36. One course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

71S, 72S. Special Topics in Mathematics: For Freshmen and Sophomores. Selected topics from problem solving, number theory, geometry, topology, mathematical logic, and other areas of mathematics. Prerequisite: consent of instructor. One course, half course, respectively. *Staff*

103. Intermediate Calculus. Partial differentiation, multiple integrals, topics in differential and integral vector calculus. Prerequisite: Mathematics 32, 34, or 41. One course. *Staff*

103X, 104X. Honors Intermediate Calculus and Linear Algebra. Similar to Mathematics 103, 104, but more theoretical. Students who have taken 31X, 32X are encouraged to enroll. Students continuing from 103X should take 104X rather than 104. One course each. *Staff*

104. Linear Algebra and Applications. Systems of linear equations and elementary row operations, Euclidean n -space and subspaces, linear transformations and matrix representations, Gram-Schmidt orthogonalization process, determinants, eigenvectors and eigenvalues; applications. Prerequisite: Mathematics 32, 34, 36, or 41. One course. *Staff*

111. Applied Mathematical Analysis I. First and second order differential equations with applications; matrices, eigenvalues, and eigenvectors; linear systems of differential equations; Fourier series and applications to partial differential equations. Intended primarily for engineering and science students with emphasis on problem solving. Not open to students who have had Mathematics 131. Prerequisite: Mathematics 103. One course. *Staff*

114. Applied Mathematical Analysis II. Boundary value problems, complex variables, Cauchy's theorem, residues, Fourier transform, applications to partial differential equations. Not open to students who have had Mathematics 181 or 230. Prerequisites: Mathematics 111 or 131, or 103 and consent of instructor. One course. *Staff*

123S. Geometry. Euclidean geometry, inversive and projective geometries, topology (Möbius strips, Klein bottle, projective space), and non-Euclidean geometries in two and three dimensions. Prerequisite: Mathematics 32 or 34 or 41, or consent of instructor. One course. *Staff*

124. Combinatorics. Permutations and combinations, generating functions, recurrence relations; topics in enumeration theory, including the Principle of Inclusion-Exclusion and Polya Theory; topics in graph theory, including trees, circuits, and matrix representations; applications. Prerequisite: Mathematics 104 or 106 or consent of instructor. One course. *Staff*

126. Introduction to Linear Programming and Game Theory. Fundamental properties of linear programs; linear inequalities and convex sets; primal simplex method, duality; integer programming; two-person and matrix games. Prerequisites: Mathematics 32 or 34 or 41, and 103 and 104 or consent of instructor. One course. *Staff*

128. Number Theory. Divisibility properties of integers, prime numbers, congruences, quadratic reciprocity, number-theoretic functions, simple continued fractions, rational approximations. Prerequisite: Mathematics 32 or 34 or 41 or consent of instructor. One course. *Staff*

131. Elementary Differential Equations. Solution of differential equations of elementary types; formation and integration of equations arising in applications. Not open to

students who have had Mathematics 111. Prerequisite: Mathematics 103; corequisite: Mathematics 104. One course. *Staff*

132S. Qualitative Theory of Ordinary Differential Equations. Qualitative behavior of general systems of ordinary differential equations, with application to biological and ecological systems, oscillations in biochemistry, electrical networks, and the theory of deterministic epidemics. Prerequisite: Mathematics 131 or 111 or consent of instructor. One course. *Staff*

135. Probability. Probability models, random variables with discrete and continuous distributions. Independence, joint distributions, conditional distributions. Expectations, functions of random variables, central limit theorem. Prerequisite: Mathematics 103. One course. *Staff*

136. Statistics. Sampling distributions, point and interval estimation, maximum likelihood estimators. Tests of hypotheses, the Neyman-Pearson theorem. Bayesian methods. Not open to students who have had Statistics 100 or 200. Prerequisites: Mathematics 104 and 135. One course. *Staff*

139. Advanced Calculus I. Algebraic and topological structure of the real number system; rigorous development of one-variable calculus including continuous, differentiable, and Riemann integrable functions and the Fundamental Theorem of Calculus; uniform convergence of a sequence of functions. Not open to students who have had Mathematics 203. Prerequisite: Mathematics 103. One course. *Staff*

150. Topics in Mathematics from a Historical Perspective. Content of course determined by instructor. Prerequisite: Mathematics 139 or 203 or consent of instructor. One course. *Staff*

150S. Topics in Mathematics from a Historical Perspective. Same as Mathematics 150, but offered as a seminar. One course. *Staff*

160. Mathematical Numerical Analysis. Zeros of functions; polynomial interpolation and splines; numerical integration and differentiation; applications to ordinary differential equations; numerical linear algebra; error analysis; extrapolation and acceleration. Not open to students who have had Computer Science 121 or 221. Satisfies the prerequisite for Computer Science 222 and 223. Prerequisites: Mathematics 103 and 104 and knowledge of an algorithmic programming language, or consent of instructor. One course. *Staff*

160S. Mathematical Numerical Analysis. Same as Mathematics 160, but offered as a seminar. One course. *Staff*

171S. Elementary Topology. Metric spaces and topological spaces; basic topological properties including compactness and connectedness; Brouwer fixed point theorem for $n=2$, classification theorem for compact, connected, 2-manifolds. Prerequisites: Mathematics 103 and 104. One course. *Staff*

181. Complex Analysis. Complex numbers, analytic functions, complex integration, Taylor and Laurent series, theory of residues, argument maximum principles, conformal mapping. Not open to students who have had Mathematics 114. Prerequisite: Mathematics 139 or 203. One course. *Staff*

187. Introduction to Mathematical Logic. Propositional calculus; predicate calculus. Gödel completeness theorem, applications to formal number theory, incompleteness theorem, additional topics in proof theory or computability. Prerequisites: Mathematics 103 and 104 or Philosophy 103. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Admission by consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

193, 194. Independent Study. Same as 191, 192, but for seniors. One course each. *Staff*

196S. Seminar in Mathematical Model Building. Real models, mathematical models, axiom systems as used in model building, deterministic and stochastic models, linear optimization, competition, graphs and networks, growth processes, evaluation of models. Term project: model of a nonmathematical problem. Prerequisites: Mathematics 103 and 104. One course. *Staff*

For Seniors and Graduates

200. Introduction to Algebraic Structures I. Laws of composition, groups, rings; isomorphism theorems; axiomatic treatment of natural numbers; polynomial rings; division and Euclidean algorithms. Prerequisite: Mathematics 104 or equivalent. One course. *Staff*

201. Introduction to Algebraic Structures II. Vector spaces, matrices and linear transformations, fields, extensions of fields, construction of real numbers. Prerequisite: Mathematics 200 or equivalent. One course. *Staff*

203. Basic Analysis I. Topology of R^n , continuous functions, uniform convergence, compactness, infinite series, theory of differentiation, and integration. Not open to students who have had Mathematics 139. Prerequisite: Mathematics 104. One course. *Staff*

204. Basic Analysis II. Inverse and implicit function theorems, differential forms, integrals on surfaces, Stokes' theorem. Not open to students who have had Mathematics 140. Prerequisite: Mathematics 203. One course. *Staff*

205. Topology. Elementary topology, surfaces, covering spaces, Euler characteristic, fundamental group, homology theory, exact sequences. One course. *Staff*

206. Differential Geometry. Geometry of curves and surfaces, the Serret-Frenet frame of a space curve, the Gauss curvature, Cadazzi-Mainardi equations, the Gauss-Bonnet formula. Prerequisite: Mathematics 104. One course. *Staff*

221. Numerical Analysis I. See C-L: Computer Science 221. One course. *Gallie or Patrick*

222. Numerical Differential Equations. Prerequisite: Computer Science 221 or equivalent. See C-L: Computer Science 222. One course. *Gardner, Greenside, Rose, or Szyld*

223. Numerical Linear Algebra. See C-L: Computer Science 223. One course. *Gardner, Greenside, Rose, or Szyld*

230. Mathematical Methods in Physics and Engineering I. Heat and wave equations, initial and boundary value problems, Fourier series, Fourier transforms, potential theory. Not open to students who have had Mathematics 114. Prerequisites: Mathematics 103 and 104 or equivalents. One course. *Staff*

231. Mathematical Methods in Physics and Engineering II. Green's functions, propagators, integral equations, spectral theory on Hilbert space, Fredholm alternative, variational methods. Prerequisite: Mathematics 114 or 230. One course. *Staff*

238, 239. Topics in Applied Mathematics. Conceptual basis of applied mathematics, combinatorics, graph theory, game theory, mathematical programming, or numerical solution of ordinary and partial differential equations. Prerequisites: Mathematics 103 and 104 or equivalents. One course each. *Staff*

240. Applied Stochastic Processes. Applications of probability theory and stochastic processes to economics and environmental science. Markoff chains, optional stopping, queuing theory, decision theory, birth and death processes, and the Monte-Carlo method. Prerequisite: Mathematics 135 or equivalent. C-L: Statistics 240. One course. *Staff*

241. Linear Models. Prerequisite: Statistics 200 or equivalent. See C-L: Statistics 241. One course. *Staff*

242. Multivariate Statistics. Prerequisite: Mathematics 241 or Statistics 241 or equivalent. See C-L: Statistics 242. One course. *Staff*

245. Functional Analysis for Scientific Computing. See C-L: Computer Science 245. One course. *Rose or Szyld*

251. Set Theory I. Zermelo-Fraenkel axioms, ordinals and cardinals, models of set theory, constructible sets. Prerequisite: Mathematics 187 or 200 or equivalent. One course. *Staff*

252. Set Theory II. Forcing, large cardinals, determinateness, and other advanced topics. Prerequisite: Mathematics 251. One course. *Staff*

258, 259. Topics in Logic. Model theory, recursion theory, set theory, or other fields of logic. Prerequisite: Mathematics 250 or equivalent. One course each. *Staff*

260. Groups, Rings, and Fields. Groups including nilpotent and solvable groups, p-groups and Sylow theorems; rings and modules including classification of modules over a PID and applications to linear algebra; fields including extensions and Galois theory. Prerequisite: Mathematics 201 or equivalent. One course. *Staff*

261. Commutative Algebra. Extension and contraction of ideals, modules of fractions, primary decomposition, integral dependence, chain conditions, affine algebraic varieties, Dedekind domains, completions. Prerequisite: Mathematics 260 or equivalent. One course. *Staff*

268, 269. Topics in Algebra. Algebraic number theory, algebraic K-theory, homological algebra, or topological algebra. Prerequisite: Mathematics 260. One course each. *Staff*

271. Algebraic Topology. Fundamental group and covering spaces, homology groups of cell complexes, classification of compact surfaces, the cohomology ring and Poincaré duality for manifolds. Prerequisites: Mathematics 171S and 200 or equivalents. One course. *Staff*

275. Differential Geometry. Differentiable manifolds, fiber bundles, connections, curvature, characteristic classes, Riemannian geometry including submanifolds and variations of the length integral, complex manifolds, homogeneous spaces. Prerequisites: Mathematics 204 and 260 or equivalents. One course. *Staff*

276. Topics in Differential Geometry. Lie groups and related topics, Hodge theory, index theory, minimal surfaces, Yang-Mills fields, exterior differential systems, several complex variables. Prerequisite: Mathematics 275 or consent of instructor. One course. *Staff*

277. Topics in Algebraic Geometry. Local theory: algebraic and topological theory of singularities. Global theory over the complex numbers: Riemann surfaces, Jacobians, Kähler manifolds, Hodge theory, theorems of Lefschetz and Kodaira. Scheme theory: schemes, duality theorems, arithmetic varieties. Prerequisite: consent of instructor. One course. *Staff*

278, 279. Topics in Topology. Point set, algebraic, geometric, or differential topology. Prerequisite: consent of instructor. One course each. *Staff*

281. Real Analysis I. Measures; Lebesgue integral; L^p spaces; Daniell integral, differentiation theory, product measures. Prerequisite: Mathematics 204 or equivalent. One course. *Staff*

282. Real Analysis II. Metric spaces, fixed point theorems, Baire category theorem,

Banach spaces, fundamental theorems of functional analysis, Fourier transform. Prerequisite: Mathematics 281 or equivalent. One course. *Staff*

284. Topics in Functional Analysis. Advanced spectral analysis, operator algebras, nonlinear functional analysis, or structure theory of Banach spaces. Prerequisite: Mathematics 282 or equivalent. One course. *Staff*

285. Complex Analysis. Complex calculus, conformal mapping, Riemann mapping theorem, Riemann surfaces. Prerequisite: Mathematics 204 or equivalent. One course. *Staff*

286. Topics in Complex Analysis. Geometric function theory, function algebras, several complex variables, uniformization, or analytic number theory. Prerequisite: Mathematics 285 or equivalent. One course. *Staff*

290. Probability. Random variables, independence, expectations, laws of large numbers, central limit theorem, Markoff chains. Prerequisite: Mathematics 281 or equivalent. One course. *Staff*

293, 294. Topics in Probability Theory. Ergodic theory, multiparameter stochastic processes and random fields, stochastic control theory, or stochastic differential equations. Prerequisite: Mathematics 290 or consent of instructor. One course each. *Staff*

295. Fourier Analysis and Distribution Theory. Tempered distributions, Fourier transforms, classical inequalities, and oscillatory integrals. Prerequisites: Mathematics 204 and 285 or equivalents. One course. *Staff*

296. Ordinary Differential Equations. Existence and uniqueness theorems for nonlinear systems, well-posedness, two-point boundary value problems, phase plane diagrams, stability, dynamical systems, and strange attractors. Prerequisites: Mathematics 104, 111 or 131, and 203 or 139. One course. *Staff*

297. Partial Differential Equations I. Fundamental solutions of linear partial differential equations, hyperbolic equations, characteristics, Cauchy-Kowalevski theorem, propagation of singularities. Prerequisite: Mathematics 204 or equivalent. One course. *Staff*

298. Partial Differential Equations II. Elliptic boundary value problems, regularity theorems, the diffusion equation, and nonlinear equations. Prerequisite: Mathematics 297 or equivalent. One course. *Staff*

299. Topics in Partial Differential Equations. Hyperbolic conservation laws, pseudo-differential operators, variational inequalities, theoretical continuum mechanics. Prerequisite: Mathematics 298 or equivalent. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

31P, 32P. Preceptorial

36. Calculus for the Social Sciences

103P. Preceptorial

104P. Preceptorial

105. Intermediate Calculus with Digital Computation

106. Linear Algebra with Digital Computation

135P, 136P. Preceptorial

140. Advanced Calculus II

140S. Advanced Calculus II

- 197S. Seminar in Mathematics
- 198S, 199S. Honors Seminar in Mathematics
- 234. Mathematics for Quantum Mechanics
- 235. Topics in Mathematical Physics
- 250. Introductory Mathematical Logic
- 280. Differential Analysis
- 283. Linear Operators
- 288, 289. Topics in Analysis

THE MAJOR

The Department of Mathematics publishes a handbook to guide majors in selecting courses for various areas of interest. A copy may be obtained from the Director of Undergraduate Studies.

For the A.B. Degree

Prerequisites. Mathematics 103 and 104 or equivalent courses.

Major Requirements. Six courses in mathematics numbered above 106, including either Mathematics 139 or Mathematics 203 and 204. At most two of the following courses may be counted: Computer Science 121, 125; Statistics 100, 200; approved courses taken at another area University while in residence at Duke.

For the B.S. Degree

Prerequisites. Mathematics 103 and 104 or equivalent courses.

Major Requirements. Eight courses in mathematics numbered above 106, including (1) either Mathematics 139 or Mathematics 203, 204; and (2) one of the sequences 135, 136; 160 (or 221), 222 (or 223); 200, 201; 205 (or 171S), 206; 230, 231. At most three of the following courses may be counted: Computer Science 121, 125; Statistics 100, 200; approved courses taken at another area University while in residence at Duke. Students must also meet an area of concentration requirement by (1) satisfying the major requirement of any discipline other than mathematics or by (2) completing a program of four mathematically related courses approved by the Director of Undergraduate Studies.

Honors

The department offers a program for graduation with distinction in mathematics. See the section on honors in this bulletin and also the *Handbook for Majors*.

School of Medicine—Basic Science Courses Open to Undergraduates

Qualified students in arts and sciences may select courses from the following offered by the graduate departments associated with the School of Medicine. A major is not offered to undergraduates in any of the departments listed below. For permission to register for these courses and for further information, see Professors Cartmill (anatomy), Webster (biochemistry), Willett (microbiology and immunology), Bigner (pathology), or Padilla (physiology). The 200-level courses below are described in the *Bulletin of Duke University: Graduate School*.

Anatomy (ANA)

151. Anatomy of the Lower Extremities as It Relates to Locomotion. Prerequisite: written consent of instructor. One course. *Bassett*

- 166S. Comparative Neurobiology. Prerequisite: consent of instructor. C-L: Psychology 166S. One course. *W. C. Hall and Diamond*
- 191, 192, 193, 194. Independent Study. Open to qualified juniors and seniors with consent of instructor. No more than three of these may be taken for credit. Four courses. *Staff*
219. Molecular and Cellular Bases of Differentiation. C-L: Biochemistry 219, Microbiology and Immunology 219, Pathology 219, and Physiology 230. One course. *Counce and staff*
220. Developmental Biology. Prerequisite: a course in genetics or cell biology. One course. *Counce*
225. Neurobiology of Sensory Systems. Prerequisites: Anatomy 201, 202, Physiology 200, 201, their equivalents, or consent of instructor. C-L: Physiology 225. One course. *Corless or Simon*
- 246S. The Primate Fossil Record. Prerequisite: a course in human evolution. C-L: Anthropology 246S. One course. *Simons*
259. Molecular Biology I: Protein and Membrane Structure/Function. Prerequisite: introductory biochemistry or consent of instructor. C-L: Biochemistry 259 and Microbiology and Immunology 259. One course. *Erickson and staff*
- 266S. Comparative Neurobiology. Same as 166S except additional term paper is required. C-L: Psychology 266S. One course. *W. C. Hall and Diamond*
269. Advanced Cell Biology. Prerequisite: introductory cell biology or consent of instructor. C-L: Botany 269, Microbiology and Immunology 269, and Zoology 269. One course. *McClay and staff*
286. Electron Microscopy and Related Techniques. Prerequisites: calculus and one year each of physics and general chemistry; or consent of instructor. One course. *Longley*
292. Topics in Morphology and Evolution. Prerequisite: consent of instructor. One course. *Smith*

Courses Currently Unscheduled

- 219S. Seminar

Biochemistry (BCH)

- 209, 210. Independent Study. One or two courses. *Staff*
215. Genetic Mechanisms. Prerequisite: introductory biochemistry. C-L: Genetics—The University Program. One course. *Webster and staff*
219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Microbiology and Immunology 219, Pathology 219, and Physiology 230. One course. *Counce and staff*
222. Structure of Biological Macromolecules. Half course. *Richardson*
227. Introductory Biochemistry I: Intermediary Metabolism. Prerequisite: organic chemistry. C-L: Botany 227. One course. *Fridovich and Rajagopalan*
259. Molecular Biology I: Protein and Membrane Structure/Function. Prerequisite: introductory biochemistry or consent of instructor. C-L: Anatomy 259 and Microbiology and Immunology 259. One course. *Richardson and staff*
- 265S, 266S. Seminar. Topics and instructors announced each semester. Half course or variable. *Staff*
268. Molecular Biology II: Nucleic Acids. Prerequisites: introductory biochemistry and Biochemistry 259 or consent of instructor. C-L: Botany 268 and Microbiology and Immunology 268. One course. *Modrich and staff*
291. Physical Biochemistry. Prerequisites: Chemistry 161 and 162 or equivalents. One course. *Hsieh and staff*
297. Intermediary Metabolism. One course. *Siegel and staff*
299. Nutrition. Half course. *Kamin*

Courses Currently Unscheduled

228. Introductory Biochemistry II: Biological Macromolecules
- 245L. Macromolecules, Ecology, and Evolution
- 276L. Comparative and Evolutionary Biochemistry

Microbiology and Immunology (MIC)

- 209, 210. Independent Study. A laboratory or library project. Approval of Director of Undergraduate Studies and instructor required. Credit to be arranged. *Staff*
214. Fundamentals of Electron Microscopy. Prerequisites: Biology 14 and consent of instructor. One course. *Miller*
219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Pathology 219, and Physiology 230. One course. *Counce and staff*
221. Medical Microbiology. Prerequisite: consent of instructor. One course. *Joklik and staff*
- 221L. Medical Microbiology. Prerequisite: consent of instructor. One and one-half courses. *Joklik and staff*
234. Introduction to Biostatistical Methods. Prerequisite: elementary mathematics including college algebra. One course. *Dawson*
244. Principles of Immunology. An introduction to the molecular and cellular basis of the immune response. Topics include anatomy of the lymphoid system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms, and control of immune responses. Prerequisites: Zoology 160 and Chemistry 152 and consent of instructor. C-L: Zoology 244. One course. *Amos, McClay, and staff*
- 246S. Parasitic Diseases. Prerequisites: Microbiology 244 or 291, and Biochemistry 227 or equivalent. One course. *Balber*
259. Molecular Biology I: Protein and Membrane Structure/Function. Prerequisite: introductory biochemistry or consent of instructor. C-L: Anatomy 259 and Biochemistry 259. One course. *Richardson and staff*

268. Molecular Biology II: Nucleic Acids. Prerequisites: introductory biochemistry and Microbiology 259 or consent of instructor. C-L: Biochemistry 268 and Botany 268. One course. *Modrich and staff*

269. Advanced Cell Biology. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Botany 269, and Zoology 269. One course. *McClay and staff*

Pathology (PTH)

All courses require consent of instructor and Director of Graduate Studies.

210. Independent study. Prerequisite: senior standing. Credit to be arranged. *Staff*

219. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Microbiology and Immunology 219, and Physiology 230. One course. *Counce and staff*

258. Cellular and Subcellular Pathology. Half course. *Shelburne and Sommer*

275. Fundamentals of Electron Microscopy and Biological Microanalysis. One course. *Shelburne, Ingram, Brody, and Sommer*

Physiology (PHS)

200. Medical Physiology. Limited to students whose training requires knowledge of human physiology as it pertains to medicine. Four lectures, one conference, and one clinical correlation per week. Open to undergraduates only with consent of course leader. One course. *Padilla and staff*

204. Introduction to Modern Physiology. Prerequisites: Physiology 200 or equivalent and consent of instructor. One course. *Blum and staff*

205. Design and Analysis of Biological Experiments. Half course. *Lobaugh*

208. Respiratory System in Health and Disease. Prerequisite: consent of instructor. Half course. *Camporesi and Kylstra*

210. Individual Study. Prerequisites: senior standing and consent of Director of Undergraduate Studies. Credit to be arranged. *Padilla and staff*

217. Membrane Transport. Prerequisite: consent of instructor. One course. *Mandel and staff*

225. Neurobiology of Sensory Systems. Prerequisites: Anatomy 201, 202, Physiology 201, 202, their equivalents, or consent of instructor. C-L: Anatomy 225. One course. *Corless or Simon*

230. Molecular and Cellular Bases of Differentiation. C-L: Anatomy 219, Biochemistry 219, Microbiology and Immunology 219, and Pathology 219. One course. *Padilla and staff*

Courses Currently Unscheduled

203. Introduction to Biophysics and Biophysical Chemistry

260S. Interactions of Differentiated Cells

Medieval and Renaissance Studies Program

Professor L. Patterson, *Chairman*; Professor Witt, *Director of Undergraduate Studies*

A major is available in this program.

The program in Medieval and Renaissance Studies is designed to provide the student with a well-rounded understanding of the historical, cultural, and social forces that shaped the medieval and Renaissance periods. The program is divided into four areas of study: fine arts (art and musicology); history; language and literature (English, French, German, Greek, Italian, Latin, and Spanish); and philosophy-religion. An interdisciplinary major is offered. See the section on the major below.

The courses listed below are among those now available in the program, and they are described under the listings of the specified departments.

Art and Art History

129. The Age of Justinian. *Wharton*

132. Romanesque Art. *Bruzelius*

133. Gothic Art. *Bruzelius*

134. Medieval Architecture. *Bruzelius*

135. Gothic Cathedrals. *Bruzelius*

136. Gothic Cathedrals. Taught in French. *Bruzelius*

137. The Twelfth Century. *Staff*

140. Giotto and the Origins of the Renaissance. *Goffen*

141. Fifteenth-Century Italian Art. *Goffen or Spencer*

142. Sixteenth-Century Italian Art. *Goffen or Spencer*

145. Renaissance Art in Florence. *Spencer*

146. Italian Renaissance Architecture. *Spencer*

147. Venetian Art: Fifteenth Century to the Eighteenth Century. *Goffen*

148. Art of the Netherlands in the Fifteenth Century. *Staff*

150. Prints in the Fifteenth, Sixteenth, and Seventeenth Centuries. *Staff*

152. Art of the Netherlands in the Sixteenth Century. *Staff*

230S. Medieval and Byzantine Art and Architecture. *Wharton*

232S. Romanesque and Gothic Art and Architecture. *Bruzelius*

240. Italian Art. *Goffen or Spencer*

242S. Studies in Italian Renaissance Art. *Goffen or Spencer*

Classical Studies

117. Ancient Mythographers. *Newton*

Comparative Literature

123. Approaches to Arthurian Romance. *Staff*

Drama

126. French Drama of the Seventeenth Century. C-L: French 148. *Staff*

English

121. Medieval English Literature to 1500. *Nygard or L. Patterson*

122. Sixteenth-Century English Literature. *DeNeef, Fish, or A. Patterson*

123. English Literature: 1600 to 1660. *DeNeef, Fish, A. Patterson, or Randall*

141. Chaucer. *DeNeef, Nygard, or L. Patterson*

143, 144. Shakespeare. *DeNeef, Gopen, Jackson, Jones, A. Patterson, Porter, Randall, or G. Williams*

145. Milton. *Fish, A. Patterson, Price, or Schwartz*

182. Western Renaissance Drama, Classical to Neoclassical. *Clum*

208. History of the English Language. *Butters or Nygard*

212. Middle English Literature: 1100 to 1500. *Fish, Gopen, Nygard, or L. Patterson*

221. Renaissance Prose and Poetry: 1500 to 1660. *DeNeef, Fish, A. Patterson, Randall, Schwartz, or G. Williams*

225. Renaissance Drama: 1500 to 1642. *A. Patterson, Randall, or G. Williams*

French

145S. Topics in Renaissance Literature and Culture. *Tétel*

146S. Montaigne and Self-Portraiture. *Tétel*

148. French Drama of the Seventeenth Century. *Staff*

211. History of the French Language. *Hull*

248. French Literature of the Seventeenth Century. *Staff*

German

205, 206. Middle High German. *Staff*

215S. Seventeenth-Century Literature. *Borchardt*

216. History of the German Language. *Staff*

217S. Renaissance and Reformation Literature. *Borchardt*

History

104. The Intellectual Life of Europe, 1250-1600. *Robisheaux or Witt*

107. Social and Cultural History of England. *Cell or Herrup*

117. Early Modern Europe. *Neuschel*

133. Medieval Europe, 300-1400. *Young*

134. Medieval England. *Young*

138. Early Modern Germany. *Robisheaux*

173. History of Spain from Late Medieval Times to Present. *TePaske*

174. History of Colonial Hispanic America from Pre-Columbian Times to the Wars of Independence. *TePaske*

195S.01-196S.01. Renaissance Intellectual History, 1300 to 1600. *Witt*

195S.13-196S.13. Problems in Early Modern English History. *Herrup*

195S.20. Comparative Problems in Early Modern European History. *Neuschel or Robisheaux*

195S.28. The Black Death and the Crisis of Late Medieval Europe. *Robisheaux*

207, 208. Constitutional History of Britain: The Rise of the Common Law. *Herrup*

222. Problems in the Intellectual History of the European Renaissance and Reformation. *Witt*

237S. Europe in the Early Middle Ages. *Young*

238S. Europe in the High Middle Ages. *Young*

267S-268S. From Medieval to Early Modern England. *Herrup*

Interdisciplinary Courses

21S. Freshman Seminar: Topics in Medieval Studies. *Staff*

22S. Freshman Seminar: Topics in Renaissance Studies. *Staff*

114. Introduction to Medieval Studies. *Solterer, Witt, and staff*

115. Introduction to Renaissance Studies. *Robisheaux, Schwartz, and staff*

160S. Topics in Medieval and Renaissance Studies. *Staff*

Italian

101. Writers of the Middle Ages and Quattrocento. *Caserta or Finucci*

102. Writers from the Renaissance to Pre-Romanticism. *Caserta or Finucci*

284, 285. Dante. *Caserta*

Latin

221. Medieval Latin. *Newton*

Music

- 155S. Music History I: Antiquity, Middle Ages, Early Renaissance. *Higgins, Seebass, or Silbiger*
- 156S. Music History II: Late Renaissance, Baroque. *Bartlet, Higgins, Seebass, or Silbiger*
- 211. Notation. *Williams*
- 222. Music in the Middle Ages. *Staff*
- 223. Music in the Renaissance. *Staff*

Philosophy

- 119. Medieval Philosophy. *Mahoney*
- 120. Late Medieval and Renaissance Philosophy. *Mahoney*
- 218S. Medieval Philosophy. *Mahoney*
- 219S. Late Medieval and Renaissance Philosophy. *Mahoney*

Religion

- 134. Jewish Mysticism. *Bland*
- 162. Introduction to Islamic Civilization. *Lawrence and staff*

Spanish

- 108S. Spanish Traditional Poetry. *Garci-Gómez*
- 151. Spanish Literature of the Renaissance and the Baroque. *Ross or Wardropper*
- 153. Golden Age Literature: Cervantes. *Staff*
- 210. History of the Spanish Language. *Garci-Gómez*
- 251. The Origins of Spanish Prose Fiction. *Wardropper*
- 253. Cervantes. *Wardropper*
- 254. Drama of the Golden Age. *Wardropper*
- 258S. Spanish Lyric Poetry before 1700. *Wardropper*

THE MAJOR

A major consists of at least eight courses drawn from the nonintroductory courses of the four areas of study (fine arts, history, language and literature, and philosophy-religion). Three courses in each of two areas must be included. Besides the courses specifically listed (under departmental and Interdisciplinary Course headings) in the medieval and Renaissance periods, provision may be made for independent study in any of the four areas.

Each program is tailored to the needs and interests of the student under the supervision of a committee consisting of faculty members from appropriate departments. After discussion with the Director of Undergraduate Studies for Medieval and Renaissance Studies, the student submits a provisional program of study outlining special interdisciplinary interests. Normally the program is planned well before the end of the sophomore year to allow time to acquire a working knowledge of languages pertinent to specific interests.

Microbiology and Immunology (MIC)

For courses in Microbiology and Immunology, see School of Medicine—Basic Courses Open to Undergraduates.

Military Science—Army ROTC (MSC)

Professor De Vitto, Lieutenant Colonel, U.S. Army, *Chairman*; Visiting Assistant Professor Earle, Major, U.S. Army, *Director of Undergraduate Studies*; Visiting Assistant Professor Morris, Major, U.S. Army, *Supervisor of Freshman Instruction*; Visiting Assistant Professors Dillard, Captain, U.S. Army and Jones, Major, U.S. Army

The Department of Military Science offers students from all disciplines within the University the opportunity to learn the theory behind and the practical application of skills involving the following areas: leadership, management (time, personnel, and materiel), communications, land navigation, military law, and tactics. Non-ROTC students may take courses without incurring an obligation to the Army.

The Army ROTC program is made up of a two-year basic course of study (freshman and sophomore level) which is taken without obligation by non-scholarship students, and a two-year advanced course of study (junior and senior level) which includes a six-week advanced camp, usually completed during the summer prior to the senior year.

Direct entry into the advanced course is sometimes permitted if an applicant has previous military training or experience, or when a six-week basic camp is completed. To be eligible for participation in the advanced course, students must successfully complete the basic course (unless direct entry is permitted), be physically qualified, be of good moral character, have a minimum of two years remaining as a student (undergraduate or graduate level, or a combination), and sign a contract to accept a commission in the United States Army, the Army National Guard, or the Army Reserve as directed by the Secretary of the Army.

Laboratory is mandatory each semester for scholarship cadets and non-scholarship cadets in their second or later semester of ROTC. Some specific laboratories are required for non-ROTC students taking Military Science 51, 52, and 113. Students should consult the Department of Military Science (telephone 1-800-222-9184, toll free) for more detailed information. Also see the Army Reserve Officers' Training Corps section under Special Programs in this bulletin.

1L. Fall Semester Laboratory. Drill and ceremonies, marksmanship training, land navigation exercises, first aid, and confidence course training. Mandatory for Army ROTC scholarship cadets and nonscholarship cadets in their second or later semester of ROTC who are enrolled in Military Science 11, 51, 113, and 151. Must be repeated with each course. No credit. *Dillard*

2L. Spring Semester Laboratory. Drill and ceremonies, communications, and tactical exercises. Mandatory for Army ROTC scholarship cadets and nonscholarship cadets in their second or later semester of ROTC who are enrolled in Military Science 12, 52, 114, and 152. Must be repeated with each course. No credit. *Dillard*

11. Introduction to ROTC and the Army. The military organization with emphasis on tradition, doctrine, and contribution to national objectives. Laboratory required for ROTC scholarship cadets only. Half course. *Earle or Morris*

12. The Military Profession. Introduction to the concept of the military as a profession. Questions of ethics and values in the military; the issue of war and morality. Laboratory required for ROTC cadets only. Half course. *Earle or Morris*

51. Military Topography. Interpretation and use of topographical maps to facilitate land navigation. Consideration of the military significance of terrain. Laboratory required for Army ROTC cadets only, with minor exceptions. Half course. *Staff*

52. Introduction to Small Unit Tactics. Introduction to planning, organizing, and conducting small unit offensive and defensive operations. Consideration of the principles of war. Laboratory required for Army ROTC cadets only, with minor exceptions. Half course. *Staff*

113. Advanced Military Operations. Fundamentals of the conduct of military operations including advanced military topography; unit movements; route planning; nuclear, biological, and chemical defense; and military communications. Laboratory required for Army ROTC cadets only. Prerequisite: Military Science 51. One course. *Dillard*

114. Advanced Tactical Applications. Study of the Warsaw Pact Forces to include doctrine, organization, equipment, and training. Conduct of platoon offensive, defensive, and patrolling operations for Army infantry units. Laboratory required for Army ROTC cadets only. Prerequisite: Military Science 52. One course. *Dillard*

151. Military Justice and the Law of War. Introduction to the Uniform Code of Military Justice and its relationship to the American legal system. Theory and practice of the law of war as embodied in the Geneva, Hague, and other agreements. Laboratory required for Army ROTC cadets only. One course. *Jones*

152. Leadership and Command Management. Theory and practice of leadership

and military management techniques for mission accomplishment. Laboratory required for Army ROTC cadets only. One course. *Jones*

191. Independent Study. Directed readings and research in military science. One course. *De Vitto*

Music (MUS)

Professor Williams, *Chairman*; Assistant Professor Henry, *Assistant to the Chairman*; Artist-in-Residence Parkins, *Director of Undergraduate Studies*; Professors Bryan and Silbiger; Associate Professors Seebass and Todd; Assistant Professors Bartlet, Gilliam, Higgins, Hill, and Jaffe; Adjunct Assistant Professor Druesedow; Artists-in-Residence Coleman, Jeffrey, Love, Muti, Szász, Troxler, and Wynkoop; Artists-in-Residence (Institute of the Arts) Bagg, Berg, Bloom, and Raimi; Staff Associates Dimsdale, Gilmore, Hanks, Hawkins, Ketch, Lail, Mizesko, Peck, Pederson, Taylor, and Weddle

A major is available in this department.

For over two thousand years, music has been viewed as a crucial part of education, compulsory in some cultures, optional in many, formative in all. Music is customarily regarded as an art, but as a university subject it has its own scientific language, logic, and grammar, in the understanding of which the mind is stretched and tested. Furthermore, music as taught at Duke includes assumptions that history, theory, composition, and performance are areas of comparable worth both in themselves and as a means of understanding the many facets of musicianship. Almost every student has some personal involvement with music (often with the many kinds of music), and the courses aim to further that involvement, whether passive or active, a simple hobby or compelling force.

Courses include many kinds of instruction: instrumental lessons, history and theory lectures, harmony classes, composition seminars, ensemble participation, practical laboratory work (such as ear-training), and coaching sessions for conductors. Emphasis is placed equally on theory and practice, and students' musical activity can vary widely across the spectrum from composing their own music to endeavoring to understand the technical, historical, and sociological context of other composers' music.

Musical studies can have a particular value in Program II. So many areas of interest in literature (English and world literature), the arts, art history, sociology, politics, philosophy, religion, psychology, and physics are illustrated, paralleled, or elucidated by aspects of music, just as music itself is by those other disciplines.

THEORY AND COMPOSITION

The department's theory courses are designed to give the student a deeper understanding of musical materials: harmony, counterpoint, voice leading, and musicianship. This is accomplished through analysis of repertoire, composition, aural work, and keyboard playing (score reading, figured bass, and simple improvisation).

36. Acoustics and Music. No previous knowledge of physics is assumed. See C-L: Physics 36. One course. *Lawson*

55. Introduction to Music Theory. Fundamentals of notation, melodic and harmonic practice, analysis, and score reading, as a basis for independent work. Does not count for major requirements. Prerequisite: some ability to read music. One course. *Troxler*

65. Fundamentals of Music Theory. Physical properties of sound, principles of diatonic tonal organization, melodic and harmonic constructions, elementary counterpoint, and figured bass. Laboratory. Prerequisite: basic knowledge of musical notation and vocabulary. One course. *Hill, Jaffe, or Wynkoop*

66. Tonal Harmony. Harmonic language of eighteenth and nineteenth centuries, functional chromaticism, and introduction to musical forms. Laboratory. Prerequisite: Music 65. One course. *Hill, Jaffe, or Wynkoop*

67S. Composition I. Composing original music in smaller forms for voice, piano, and other instruments. Studies in compositional techniques. Prerequisites: Music 65 and 66 or consent of instructor. One course. *Jaffe*

68S. Composition II. See Music 67S. Prerequisites: Music 65 and 66 or consent of instructor. One course. *Jaffe*

75. Jazz Improvisation. The theory of jazz improvisation for all instruments and its practical application to the different styles of jazz. Prerequisite: consent of instructor. Half course. *Jeffrey*

115S. Modal Counterpoint. Polyphonic practice of the fifteenth and sixteenth centuries; sacred and secular music. Laboratory. Prerequisite: Music 66 or consent of instructor. One course. *Higgins*

116S. Tonal Counterpoint. Polyphonic practice of the seventeenth, eighteenth, and nineteenth centuries; sacred and secular music. Laboratory. Prerequisite: Music 115S or consent of instructor. One course. *Higgins, Jaffe, or Todd*

122. Orchestration. Characteristics and transpositions of the instruments. Scoring for symphony orchestra; concert band; and string, woodwind, brass, and percussion ensembles from pre-existing piano scores or the student's original compositions. Prerequisite: Music 116S. One course. *Jaffe*

128. Instrumental Conducting. Development of techniques of conducting instrumental ensembles with emphasis on orchestral repertoire. Score-reading and analysis, principles of interpretation, and practical conducting experience. Prerequisite: Music 116S or consent of instructor. One course. *Muti*

129. Choral Conducting. Development of techniques of conducting vocal repertoire, ranging from church anthems to large-scale works. Score-reading and analysis, principles of interpretation, and practical conducting experience. Prerequisite: Music 116S or consent of instructor. One course. *Wynkoop*

HISTORY, LITERATURE, AND MUSICOLOGY

The study of music history and literature contributes to a broader knowledge of culture and society. Courses offer students the opportunity to examine compositions in their historic and/or social context. In addition to surveying significant forms, genres, and styles, and their development, the courses include consideration of music's function, the place of musicians, aspects of performance practice, and aesthetic value. Although the normal prerequisite for Music 155S-158S (Music History I-IV) is Music 65, interested students in other disciplines with some background in music are encouraged to ask individual instructors for permission to enroll.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

74. Introduction to Jazz. A survey examining musical, aesthetic, sociological, and historical aspects. For nonmajors. C-L: Afro-American Studies 74. One course. *Jeffrey*

76. Introduction to the Symphony. Selected works from the classical, romantic, impressionist, and contemporary periods that examine the creation, enjoyment, and evaluation of symphonic literature. Development of critical abilities through the study of style, structure, and orchestration in the symphony, concert suite, symphonic poem, and program symphony. For nonmajors. One course. *Henry*

119. The Humanities and Music. A historical survey of the relationship of significant literary texts to music, exemplifying literary genres and concepts with musical works from antiquity to the nineteenth century. Readings from primary literary sources, listening to representative musical settings. Does not count for the major in music. One course. *Bartlet, Higgins, or Seebass*

120. Women in Music. The lives and works of the principal women composers and musicians of Western art music from the Middle Ages to the present within their contemporary intellectual, artistic, sociological, and economic contexts. The extent to which gender as an historical variable affected their creative activities and achievements as well as the critical assessment of their canon. C-L: Women's Studies. One course. *Higgins*

125. Masterworks of Music. Historical, biographical, and analytical study of works by major composers of the seventeenth through the twentieth centuries. C-L: Comparative Area Studies. One course. *Staff*

135. American Music to 1900. Music from the settlement of the Pilgrims in 1620 to the early ragtime era (the 1890s). Hymnody, stage music, popular song, instrumental concert music, national tunes, and other genres. One course. *Druesedow*

136S. Introduction to Non-Western Music. Study of social and religious contexts. Native instruments and related craftsmanship. C-L: Comparative Area Studies. One course. *Seebass*

138. Music in East and Southeast Asia. An introduction to the musical culture of Japan, China, mainland Southeast Asia, Indonesia, and the Philippines. Notation, performance, and musical instruments; historical, religious, and social context. C-L: Comparative Area Studies. One course. *Seebass*

139. Twentieth-Century Music. Influential creative stylistic developments in music of the present century. A critical survey of works by Bartók, Berg, Schoenberg, Stravinsky, and Webern as a means of establishing a relative standard of values for subsequent independent exploration. Prerequisite: a one-year course in music theory or literature, or consent of instructor. One course. *Jaffe or Todd*

143. Beethoven and His Time. The music of Beethoven and its relation to contemporary historical, social, and literary developments. Emphasis on the nine symphonies. One course. *Bartlet, Silbiger, or Todd*

144. Bach and His Time. The music of Johann Sebastian Bach and its historical and cultural background, with emphasis on the sacred and the instrumental works. Some consideration also given to the music of Bach's contemporaries, including Vivaldi, Rameau, and Handel. C-L: Comparative Area Studies. One course. *Silbiger*

145. Mozart and His Time. A biographical sketch and a study of his works in their relationship to the past and to works of contemporaries in various European countries. One course. *Seebass*

155S. Music History I: Antiquity, Middle Ages, Early Renaissance. Prerequisite: for music majors, Music 65 or consent of instructor; for nonmajors, consent of instructor. C-L: Medieval and Renaissance Studies. One course. *Higgins, Seebass, or Silbiger*

156S. Music History II: Late Renaissance, Baroque. Prerequisite: for music majors, Music 65 or consent of instructor; for nonmajors, consent of instructor. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Bartlet, Higgins, Seebass, or Silbiger*

157S. Music History III: Rococo and Classic. Prerequisite: for music majors, Music 65 or consent of instructor; for nonmajors, consent of instructor. C-L: Comparative Area Studies. One course. *Bartlet, Seebass, Silbiger, or Todd*

158S. Music History IV: Romanticism to the Early Modern Period. Prerequisite: for music majors, Music 65 or consent of instructor; for nonmajors, consent of instructor. C-L: Comparative Area Studies. One course. *Bartlet, Silbiger, or Todd*

161. Musicianship I. Development of practical musical skills: sight singing, ear training, and keyboard proficiency. Normally taken concurrently with Music 115S. Prerequisite: for music majors, Music 66; for nonmajors, consent of instructor. Quarter course. *Staff*

162. Musicianship II. Prerequisite: Music 161. Quarter course. *Staff*

163. Musicianship III. Prerequisite: Music 162. Quarter course. *Staff*

164. Musicianship IV. Prerequisite: Music 163. Quarter course. *Staff*

166. Opera. History of opera from the late sixteenth century to the present. Relationship of music and text; opera as social commentary; changing forms and styles. Selected composers, especially Mozart, Verdi, Puccini, and Wagner. One course. *Bartlet or Muti*

171. Bach: Master of Style. See C-L: Distinguished Professor Course 194. One course. *Williams*

185S, 186S. Seminar in Music. Primarily for junior and senior music majors. Topics to be announced. Prerequisite: consent of instructor. One course each. *Staff*

For Advanced Undergraduates and Graduates

201. Introduction to Musicology. Methods of research on music and its history, including studies of musical and literary sources, iconography, performance practice, ethnomusicology, and historical analysis, with special attention to the interrelationships of these approaches. One course. *Druesedow, Seebass, or Silbiger*

211, 212. Notation. Development and changing function of musical notation from c. 900 to c. 1900, including plainchant notations, black notations, white notations, the invention of printing (particularly movable type and engraving), keyboard and lute tablatures, scores. One course each. *Williams*

213. Theories and Notation of Contemporary Music. The diverse languages of contemporary music and their roots in the early twentieth century, with emphasis on problems and continuity of musical language. Recent composers and their stylistic progenitors: for example, Ligeti, Bartók, and Berg; Carter, Schoenberg, Ives, and Copland; Crumb, Messiaen, and Webern; Cage, Varèse, Cowell, and Stockhausen. One course. *Jaffe*

215. Music Analysis. Historical, philosophical, and ideological issues raised by music analysis. Intensive study of harmony and voice leading in the works of major tonal composers, with emphasis on the analytic approach of Heinrich Schenker. One course. *Hill or Todd*

216. Analysis of Twentieth-Century Music. Major currents in twentieth-century analytical thought: Allen Forte's theory of sets and Milton Babbitt's twelve-tone theory; ne-tonal composers Bartók and Stravinsky. One course. *Jaffe*

222. Music in the Middle Ages. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Staff*

223. Music in the Renaissance. Selected topics. C-L: Medieval and Renaissance Studies. One course. *Staff*

224. Music in the Baroque Era. Selected topics. One course. *Staff*

225. Music in the Classic Era. Selected topics. One course. *Staff*

226. Music in the Nineteenth Century. Selected topics. One course. *Staff*

227. Music in the Twentieth Century. Selected topics. One course. *Staff*

296S. Analysis of Contemporary Music. Structures, expressive intentions, and functions since 1914. Contemporary orchestral music, American music, European music, popular media, musical tradition and the contemporary composer. Analysis of works performed in the department's Encounters Series with occasional guest composers present. One course. *Jaffe*

297, 298, 299. Composition. Submission of portfolio of candidate's original work to include one major work (for example, for full orchestra or chamber group, or a short opera) and shorter works in diverse media demonstrating professional craftsmanship. Preparation of the portfolio will involve weekly independent study sessions with members of graduate faculty. One course each. *Jaffe*

INDEPENDENT STUDY AND SEMINARS

Admission to these courses will be subject to the approval of the Director of Undergraduate Studies and the instructor. The instructor and course content will be established in accordance with the individual student's interests and capacities.

179, 180. Independent Study in Musical Performance.* Open only to sophomores possessing an exceptional technical and interpretative command of a musical medium. Requires either a half-length recital at the end of each semester of study or a full-length recital at the end of the second semester. In the latter case, a brief performance before a jury of music department faculty is required at the end of the first semester. Prerequisites: previous registration in private instruction in applied music at Duke, audition, and consent of instructor. One course each. *Staff*

181, 182. Independent Study in Musical Performance.* Same as 179, 180, but for juniors. One course each. *Staff*

183, 184. Independent Study in Musical Performance.* Same as 179, 180, but for seniors. One course each. *Staff*

191, 192. Independent Study. Directed reading, research, and analysis within a prescribed area of music literature. Open only to qualified students in the junior year by consent of the department. One course each. *Staff*

193, 194. Independent Study. Same as 191, 192, but for seniors. One course each. *Staff*

APPLIED MUSIC

In conjunction with theory and history, performance is an active way of understanding music literature, facing questions of style, and honoring one's technical and expressive skills. Provided they qualify by audition, students are encouraged to enroll in private instruction and to participate in ensembles. Auditions must be arranged with the instructor prior to registration. For those students who wish to study privately but do not qualify for university-level instruction, a list of music teachers in the immediate area who are available to Duke students can be obtained from the department office. All applied music courses may be repeated for credit, but no more than two ensembles may be taken concurrently for credit.

*The schedule of fees for private lessons, as published in the subsection on fees, is applicable to courses 179, 180, 181, 182, 183, 184.

57S, 58S. Vocal Diction. 57S: Italian/English; 58S: German/French. For singers, actors, radio announcers, and public speakers. Introduction to the International Phonetic Alphabet. Students will be required to sing in class. Written, oral, and vocal performance examinations. Half course each. *Lail or Peck*

Instruction: half hour

- 78. **Class Harpsichord.** Quarter course. *Hill*
- 79. **Class Voice.** Quarter course. *Lail*
- 80. **Piano.** Quarter course. *Coleman, Hawkins, Love, or Szász*
- 81. **Strings.** Quarter course. *Bagg, Berg, Bloom, or Raimi*
- 82. **Woodwinds.** Quarter course. *Gilmore, Henry, Jeffrey, Pederson, Troxler, or Weddle*
- 83. **Brass.** Quarter course. *Dimsdale, Ketch, or Mizesko*
- 84. **Percussion.** Quarter course. *Hanks*
- 85. **Voice.** Quarter course. *Lail or Peck*
- 86. **Organ.** Quarter course. *Parkins*
- 87. **Harpsichord.** Quarter course. *Hill*

Instruction: 1 hour

- 90. **Piano.** Half course. *Coleman, Hawkins, Love, or Szász*
- 91. **Strings.** Half course. *Bagg, Berg, Bloom, or Raimi*
- 92. **Woodwinds.** Half course. *Gilmore, Henry, Jeffrey, Pederson, Troxler, or Weddle*
- 93. **Brass.** Half course. *Dimsdale, Ketch, or Mizesko*
- 94. **Percussion.** Half course. *Hanks*
- 95. **Voice.** Half course. *Lail or Peck*
- 96. **Organ.** Half course. *Parkins*
- 97. **Harpsichord.** Half course. *Hill*

Ensemble Classes: pass/fail

- 100. **Symphony Orchestra.** Quarter course. *Muti*
- 101. **Wind Symphony.** Quarter course. *Staff*
- 102. **Marching Band.** Quarter course. *Boumpani*
- 103. **Jazz Ensemble.** Quarter course. *Jeffrey*
- 106. **Chamber Music.** Quarter course. *Hawkins*
- 110. **Collegium Musicum.** Quarter course. *Hill*
- 111. **Opera Workshop.** Quarter course. *Staff*
- 112. **Chapel Choir.** Quarter course. *Smith*
- 113. **Chorale.** Quarter course. *Wynkoop*

Credit in Applied Music. (Skills courses—credit not applicable to distributional requirements.)* Credit for instruction in courses below 100 is granted on the basis of a half course per semester for one hour of private instruction per week and a minimum of six hours practice weekly; or a half course per year for one half hour of private instruction or one period of class study and a minimum of six hours practice per week. An additional weekly class meeting for performance and criticism may be required by the instructor without additional credit.

Fees. Applied music instruction in one medium (instrument or voice) is offered free to music majors. Additional instruction for music majors and all instruction for nonmajors will be charged as follows:

One half-hour private lesson per week for one semester	\$100
One one-hour private lesson per week for one semester	\$200
One half-hour class lesson per week for one semester	\$60
Registration in ensemble classes (Music 100-113)	Free

No charge is made for practice room facilities for students registered for private or class lessons in applied music. A fee schedule for the use of facilities by others not registered for applied lessons is available from the music department office.

*Subject to instructor's approval, a student at an advanced level in applied music may take courses for tutorial requirements. These courses shall be designated by adding a *T* to the appropriate course number. Students who have not reached an advanced level will continue to take the regular applied music courses.

Fees are not refundable after the final drop/add day.

See also Institute of the Arts in this bulletin.

COURSES CURRENTLY UNSCHEDULED

130T, 131T. Performance Practice (Organ) I, II

132T, 133T. Performance Practice (Organ) III, IV

137. Music in South Asia

142. The Musical Theater

160. History of the Organ and Its Literature

165. Opera in Vienna

170. Romanticism in the Arts

THE MAJOR

A major or second major in music is a means of preparing students for further professional training in the branches of the art, for graduate study as historians, composers, and performers, and for a more intimate understanding of one of life's most important experiences.

The aim of the required courses is to give a balanced selection of history, theory, composition, and performance, reinforced by constant attention to the art of listening. With the required courses as their foundation, students choose electives to further their interest in, or gifts for, a particular music activity, so that a performer will have a good theoretical background, a historian considerable experience as a player, a composer various kinds of understanding of music of the past, and so on.

Prerequisites. Music 65, 66, and one year of applied music study in an instrument or voice. Any or all of these may be exempted through demonstration of proficiency by examination and/or audition.

Major Requirements. Music 115S, 116S, 155S-158S, 161- 164 (one course), and one additional elective course in the department. Those who plan to study music beyond the undergraduate level are strongly advised to prepare themselves in two or more foreign languages.

Honors. Majors who are qualified (see the section on honors in this bulletin) may undertake work leading to graduation with distinction in music by application to the Director of Undergraduate Studies. Honors work usually involves participation in an appropriate senior seminar and/or independent study. It must culminate in a paper (historical, analytical, or theoretical), either full-length by itself or somewhat more concise if offered in conjunction with a recital or composition. The paper must be approved by a faculty committee.

Naval Science—Navy ROTC (NS)

Professor Triebel, Captain, U.S. Navy, *Chairman*; Visiting Associate Professor Meldrum, Commander, U.S. Navy, *Director of Undergraduate Studies*; Visiting Assistant Professors Perry, Lieutenant, U.S. Navy, Uphoff, Lieutenant, U.S. Navy, and Dossett, Captain, U.S. Marine Corps

Courses in naval science are open to all students. The program in naval science offers students an opportunity to gain technical knowledge in naval systems, leadership and management skills, and a pathway to a challenging career as a naval officer.

Since a major is not available in this program, scholarship program participants are encouraged to pursue majors in engineering or specific science fields, although a major in any field of study leading to a baccalaureate degree meets the basic requirement. The academic program for an approved degree and commission must include all naval science courses, laboratories, and seminars. Scholarship students must complete one year of calculus by the end of the sophomore year, one year of calculus-based physics by the end of the junior year, one year of military affairs, one year of English, one semester of computer science, and certain technical electives. Nonscholarship program students are encouraged, but not required, to take calculus and physics. Marine Corps students may substitute management and political science courses for the calculus and physics requirements.

11. Naval Orientation. Military formations, movements, commands, courtesies and honors, and elements of unit leadership. No credit. *Staff*

11L. Naval Orientation Laboratory. Practical application of the elements and material presented in Naval Science 11. No credit. *Staff*

12. Naval Ships Systems. Structure, elements of design, stability, compartmentation, communications, and propulsion systems as they bear on safe operation and combat or service effectiveness. One course. *Staff*

12L. Naval Ships Systems Laboratory. Practical application of the theories and principles of naval ships systems. No credit. *Staff*

52. Seapower and Maritime Affairs Seminar. Contemporary studies in seapower, including an examination of the rise and current status of the Soviet Navy. No credit. *Perry*

52L. Seapower Laboratory. Application and practical demonstration of the scenarios and theories presented in Naval Science 52. No credit. *Perry*

126. Concepts and Analyses of Naval Tactical Systems. Detection systems; systems integration into current naval platforms and their offensive and defensive capabilities. One course. *Perry*

126L. Naval Tactical Systems Laboratory. Practical application of the theories and principles of naval tactical systems. No credit. *Perry*

131. Navigation. Theory, principles, and procedures of ship navigation, movements, and employment. Dead reckoning, piloting, celestial and electronic principles of navigation. Naval Science 131L should be taken concurrently. One course. *Uphoff*

131L. Navigation Laboratory. Practical application of the theories and principles of navigation as presented in the lecture series. No credit. *Uphoff*

132. Naval Operations. Components of general naval operations, including concepts and application of tactical formations and dispositions, relative motion, maneuvering board and tactical plots, rules of the road, and naval communications. Naval Science 132L is a concurrent requirement. One course. *Uphoff*

132L. Naval Operations Laboratory. Practical application of the theories of naval operations as presented in the lecture series. No credit. *Uphoff*

137L, 138L. Marine Tactics Laboratory. Concepts and applications of tactical employment of Marine Amphibious Forces. Ground weapons systems, land navigation, and small unit tactics. No credit. *Dossett*

141S. Evolution of Warfare. Continuity and change in the history of warfare, with attention to the interrelationship of social, political, technological, and military factors. One course. *Dossett*

145L. Naval Organization and Management Laboratory. Lines of command and control; organization for logistics, service, and support; and research on the practical application of fundamental leadership principles. No credit. *Meldrum*

146L. Naval Ship Administration Laboratory. Concepts and applications of naval justice, shipboard administration, and training. No credit. *Meldrum*

147L, 148L. Marine Leadership Laboratory. Marine Corps career management, naval correspondence, force structure, leadership techniques, and training. No credit. *Dossett*

151S. Amphibious Operations. Development of amphibious doctrine, with attention to its current applications. One course. *Dossett*

Neurosciences Program

Professor Staddon, *Director*

A certificate, but not a major, is available in this program.

The study of the nervous system has developed into one of the most exciting areas of modern science with rapidly expanding knowledge in both basic and medically applied areas. This program offers the student the opportunity to emphasize studies in the neural sciences in the context of a flexible enough psychology-zoology interdepartmental concentration to fulfill either a preprofessional or a more general liberal arts education.

Acceptance into the interdepartmental concentration is by arrangement with the Directors of Undergraduate Studies in psychology and zoology. The interdepartmental concentration, which fulfills the requirements of a major for graduation, requires four courses beyond the introductory level in both psychology and zoology. Beyond this, acceptance into the neurosciences program is limited by the sizes of the core neurosciences courses.

The required *core* courses are Psychology 103 and Interdisciplinary Courses 200 and 201. A number of recommended *allied* courses provide flexibility in the areas of neuroscience of particular interest to each student. Independent study and research with the various faculty are encouraged. A strong background in the sciences is required.

A certificate in the neurosciences may be awarded at graduation upon successful completion of the course of study and approval of the advisory committee and Directors of Undergraduate Studies in psychology and zoology.

Further details on the neurosciences program may be obtained from the Office of the Director (Professor Staddon), 249 Sociology-Psychology Building.

THE INTERDISCIPLINARY PROGRAM

This interdisciplinary program is based on an interdepartmental concentration in psychology and zoology, plus three core courses in the neurosciences.

Core Courses

Psychology 103. Biological Bases of Behavior. Physiological, developmental, and evolutionary approaches to behavior. Sensory and cognitive processes, sleep, pain, emotion, hunger, and thirst as well as maternal and sexual behavior patterns. Prerequisite: none, but an introductory course in biology desirable. One course. *C. Erickson*

Interdisciplinary Course 200. Advanced Neuroscience I. Basic neuroanatomy and neurophysiology, physiology of the neuron and neural networks, neurotransmitter functions, sensory, and motor systems. Prerequisite: Psychology 103. C-L: Psychology 200 and Zoology 200. One course. *Cant and McClay*

Interdisciplinary Course 201. Advanced Neuroscience II. Integrative activities of the nervous system; sensory-motor relationships, neuroendocrine relationships, emotion and motivation, sleep, learning and memory, diseases of the nervous system and their psychological correlates. Prerequisite: Interdisciplinary Course 200, Psychology 200, or Zoology 200. C-L: Psychology 201. One course. *R. Erickson and W. G. Hall*

Allied Courses

A number of other courses may supplement the core courses to fulfill the inter-departmental concentration as reasonable for each individual student upon consultation with the student's adviser.

Psychology 111. Learning and Adaptive Behavior. *Staddon*

Psychology 126. Behavior and Neurochemistry. *Cooper*

Psychology 139. Motivation. *W. G. Hall*

Psychology 150S. Hormones and Behavior. *Staff*

Psychology 155S/255S. Perinatal Behavior. *W. G. Hall*

Psychology 158S/238S. Psychophysiology. *Marsh*

Psychology 166S/266S. Comparative Neurobiology. *Diamond and W. C. Hall*

Psychology 167S/267S. Brain Mechanisms of Behavior. *R. Erickson*

Psychology 219S. Physiological Foundations of Psychology. *C. and R. Erickson*

Psychology 285S. Developmental Psychobiology. *W. G. Hall*

Botany 227/Biochemistry 227. Introductory Biochemistry I: Intermediary Metabolism. *Fridovich and Rajagopalan*

Philosophy (PHL)

Professor Sanford, *Chairman*; Professor Mahoney, *Director of Undergraduate Studies*; Professors Golding and Peach; Associate Professors Brandon and Posy; Assistant Professors Ferejohn and Roderick; Professor Emeritus Welsh; Adjunct Associate Professor Ward

A major is available in this department.

The undergraduate program in the Department of Philosophy acquaints students with the content and the structure of philosophical theory in various areas. Discussion is encouraged so that students can engage actively in the philosophical examination of problems.

Course offerings fall into two general categories: the systematic and the historical. In a systematic treatment, the organization of a course is primarily in terms of the problems presented by the subject matter of that course, as in logic, ethics, and metaphysics. In historical courses, attention is directed more to the order of development in the thought of a particular philosopher (Plato, Aristotle, Kant) or in a historical period. In all courses, reading of the works of philosophers acquaints the students with the important and influential contributions to the definition and solution of philosophical issues.

The problems raised in philosophy in respect to the various fields of the arts and sciences involve questions which are not normally given attention in those particular disciplines. In the consideration of such problems, therefore, it is expected that students will acquire some understanding and perspective of the major areas of the human intellectual endeavor. In this sense, philosophical comprehension is an essential part of a student's learning and education.

Philosophy provides a sound preparation for the demands of many professions. For example, the precision of argument and broad acquaintance with intellectual traditions emphasized in philosophy form an excellent basis for the study of law.

Only *one* course from among Philosophy 41, 42, 43S, and 44S may be taken for credit. These courses are normally not open to juniors and seniors.

41. Introduction to Philosophy. Examination of problems in philosophy; emphasis on metaphysics and theory of knowledge. One course. *Staff*

42. Introduction to Philosophy. Examination of problems in philosophy; emphasis on ethics and value theory. One course. *Staff*

43S. Introduction to Philosophy. Philosophy 41 conducted as a seminar. One course. *Staff*

44S. Introduction to Philosophy. Philosophy 42 conducted as a seminar. One course. *Staff*

48. Logic. The conditions of effective thinking and clear communication. Examination of the basic principles of deductive reasoning. One course. *Brandon, Posy, Sanford, or Welsh*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

93. History of Ancient Philosophy. The pre-Socratics, Socrates, Plato, Aristotle, and post-Aristotelian systems. Prerequisites: for freshmen, previous philosophy course and consent of instructor. C-L: Classical Studies 93. One course. *Ferejohn or Mahoney*

94. History of Modern Philosophy. Bacon, Hobbes, Descartes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Prerequisites: for freshmen, previous philosophy course and consent of instructor. One course. *Peach or Posy*

102. Aesthetics: The Philosophy of Art. The concept of beauty, the work of art, the function of art, art and society, the analysis of a work of art, criticism in the arts. One course. *Staff*

103. Symbolic Logic. Detailed analysis of deduction and of deductive systems. Open to sophomores by consent of instructor. C-L: Linguistics. One course. *Brandon or Posy*

104. Philosophy of Science. The principal philosophical and methodological problems in contemporary science. One course. *Brandon*

106. Philosophy of Law. Natural law theory, legal positivism, legal realism, the relation of law and morality. One course. *Golding*

107. Political and Social Philosophy. The fundamental principles of political and social organizations. One course. *Mahoney*

109. Philosophy of Language. A philosophical analysis of problems arising in the study of language and symbolism. Topics include: theories of language, the nature of signs and symbols, theories of meaning, types of discourse (scientific, mathematical, poetic), definition, ambiguity, metaphor. C-L: Linguistics. One course. *Posy*

110. Knowledge and Certainty. Problems in the theory of knowledge: conditions of knowledge, scepticism, perception, memory, induction, knowledge of other minds, and knowledge of necessary truths. One course. *Sanford*

111. Appearance and Reality. Problems in metaphysics: theories of existence, substance, universals, identity, space, time, causality, determinism and action, and the relation of mind and body. One course. *Sanford*

112. Philosophy of Mind. Such topics as mind and body, thought, perception, persons, and personal identity. One course. *Sanford*

113. Philosophy of Mathematics. Survey of mathematical thought including the nature of infinity, Platonism, constructivism, and the foundational crisis of the early twentieth century. Prerequisite: one course in calculus or logic or philosophy; or consent of instructor. One course. *Posy*

116. Systematic Ethics. Problems in moral philosophy: the nature of morality, ethical relativism, egoism, utilitarianism. Both historical and contemporary readings, with emphasis on the latter. One course. *Golding*

117. Ancient and Modern Ethical Theories. The development of ethical thought in the West; the interaction between culture and ethical theory, with special reference to the Greek city-state, Roman law, the Renaissance, the Reformation, and the rise of modern science. Readings in the great ethical philosophers. One course. *Staff*

118. Philosophical Issues in Medical Ethics. Ethical issues arising in connection with medical practice and research and medical technology. Definition of health and illness;

experimentation and consent; genetic counseling and biological engineering; abortion, contraception, and sterilization; death and dying; codes of professional conduct; and the allocation of scarce medical resources. Prerequisites: for freshmen, previous philosophy course and consent of instructor. One course. *Brandon or Golding*

119. Medieval Philosophy. Christian, Islamic, and Jewish philosophy from late antiquity to 1300. Special emphasis on historical influences and institutional developments. Nature and destiny of humans, existence and nature of God, problem of ethical norms, political philosophy. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

120. Late Medieval and Renaissance Philosophy. Problems of political authority and nature of the state, mysticism, humanism, critical trends, background of Galileo, and impact of the Reformation related to cultural and institutional changes. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

122. Philosophical Issues in Feminism. Issues in political and moral philosophy in their bearing on feminist concerns, including political equality and rights, preferential treatment, feminist and nonfeminist critiques of pornography, and the morality of abortion. C-L: Women's Studies. One course. *Staff*

125. Philosophy of Music. The nature of music and its place in the arts. Emotion and meaning, creation and interpretation in music. Readings from a wide variety of sources. One course. *Roderick*

132. Nineteenth-Century Philosophy. Emphasis on Hegel, Marx, and Nietzsche. One course. *Roderick*

134. Existentialism. Themes and approaches in existential philosophy. Selected writings of Kierkegaard, Tolstoy, Dostoevsky, Heidegger, and Sartre. Contemporary relevance of existentialist perspectives. One course. *Ward*

135. Philosophy in Literature. Comparative examination of philosophical topics such as freedom, responsibility, good and evil, time and reality. One course. *Staff*

138. Analytic Philosophy in the Twentieth Century. An historical survey from Frege, Moore, Russell, and the logical positivism of the Vienna Circle to current developments. Philosophers covered include Wittgenstein, Ryle, Austin, Quine, and Davidson. Prerequisite: one philosophy course or consent of instructor. One course. *Posy or Sanford*

139. Twentieth-Century Continental Philosophy. A critical and historical examination of movements in European philosophy such as existentialism, structuralism, post-structuralism, hermeneutics, and critical theory. Husserl, Heidegger, Sartre, Gadamer, Habermas, and Derrida: their views of language, history, and the problems of modern society. One course. *Roderick*

191, 192, 193, 194. Independent Study. Directed reading and research. Open only to highly qualified students in the junior and senior year with consent of the department. One course each. *Staff*

For Seniors and Graduates

203S. Contemporary Ethical Theories. The nature and justification of basic ethical concepts in the light of the chief ethical theories of twentieth-century British and American philosophers. One course. *Golding*

204S. Philosophy of Law. Natural law theory and positivism; the idea of obligation (legal, political, social, moral); and the relation of law and morality. One course. *Golding*

206S. Responsibility. The relationship between responsibility in the law and moral blameworthiness; excuses and defenses; the roles of such concepts as act, intention, motive, ignorance, and causation. One course. *Golding*

208S. Political Values. Analysis of the systematic justification of political principles and the political values in the administration of law. One course. *Golding*

211S. Plato. Selected dialogues. C-L: Classical Studies 211S. One course. *Ferejohn*

217S. Aristotle. Selected topics. C-L: Classical Studies 217S. One course. *Ferejohn*

218S. Medieval Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

219S. Late Medieval and Renaissance Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. One course. *Mahoney*

225S. British Empiricism. A critical study of the writings of Locke, Berkeley, or Hume with special emphasis on problems in the theory of knowledge. One course. *Peach*

227S. Continental Rationalism. A critical study of the writings of Descartes, Spinoza, or Leibniz with special emphasis on problems in the theory of knowledge and metaphysics. One course. *Peach*

228S. Recent and Contemporary Philosophy. A critical study of some contemporary movements, with special emphasis on analytic philosophers. One course. *Posy*

231S. Kant's Critique of Pure Reason. One course. *Posy*

233S. Methodology of the Empirical Sciences. Recent philosophical discussion of the concept of a scientific explanation, the nature of laws, theory and observation, probability and induction, and other topics. Prerequisite: consent of instructor. One course. *Brandon*

234S. Problems in the Philosophy of Biology. Selected topics, with emphasis on evolutionary biology: the structure of evolutionary theory, adaptation, teleological or teleonomic explanations in biology, reductionism and organicism, the units of selection, and sociobiology. Prerequisite: consent of instructor. C-L: Botany 234S and Zoology 234S. One course. *Brandon*

235S. Hegel and Marx. Hegel's philosophy and its influence on Marx. One course. *Roderick*

250S. Topics in Formal Philosophy. Topics selected from formal logic, philosophy of mathematics, philosophy of logic, or philosophy of language. One course. *Posy*

251S. Epistemology. Selected topics in the theory of knowledge, for example, conditions of knowledge, scepticism and certainty, perception, memory, knowledge of other minds, and knowledge of necessary truths. One course. *Sanford*

252S. Metaphysics. Selected topics: substance, qualities and universals, identity, space, time, causation, and determinism. One course. *Sanford*

253S. Philosophy of Mind. Analysis of concepts such as thought and belief; issues such as mind-body relations, thought and action, the nature of persons and personal identity. One course. *Sanford*

291S, 292S. Special Fields of Philosophy. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

101. Philosophy of Religion

105. Philosophy of History

108. Social Ideals and Utopias

121. Philosophy and Film

196S, 197S, 198S, 199S. Seminars in Philosophy

202S. Aesthetics: The Philosophy of Art

205S. Philosophy of History

230S. The Meaning of Religious Language

232S. Recent Continental Philosophy

254S. Topics in Philosophy of Religion

THE MAJOR

Major Requirements. Eight courses in philosophy including Philosophy 93 and 94; at least one nonintroductory course in moral, social, political, or legal philosophy, such as Philosophy 106, 107, 108, 116, 117, 118, or 122; and at least one course at the 200 level. In addition, a course in logic is highly recommended.

Honors. The department offers work leading to graduation with distinction. See the section on honors in this bulletin.

Physics (PHY)

Professor Evans, *Chairman*; Professor Walter, *Director of Undergraduate Studies*; Professors Biedenharn, Bilpuch, De Lucia, Fairbank, Fortney, Goshaw, Han, Herbst, Meyer, Robertson, Robinson, Walker, and Weller; Associate Professors Behringer, Greenside, Palmer, and Thomas; Assistant Professors Howell and Oh; Visiting Assistant Professors Holmgren and Bittner; Instructor Haque; Instructor and Research Associates Brown, Schramm, and Vanhoy

A major is available in this department.

By studying physics students learn the methods and results of a systematic examination of the objects that make up the natural universe and of their interactions with each other. The knowledge and analytical skills thus obtained are basic to the study of the sciences and engineering. The department offers a number of courses for nonspecialists who wish to learn about the physicist's description of nature for its intrinsic intellectual value.

21, 22. These numbers represent course credit for advanced placement on the basis of the College Board Examinations "Physics-C." One course each.

32. Physics from the Historical Perspective. The historical development of physical theories is traced from early theories of the solar system to relativity and quantum theory. No previous study of physics is assumed, but the student must be able to use simple mathematics through basic algebra. One course. *Palmer or Walker*

35. Practical Physics. Fundamental concepts and laws of physics in the context of technological applications. Intended for persons not majoring in science or engineering; no previous knowledge of physics is assumed. The emphasis is on "how things work." One course. *Robinson*

36. Acoustics and Music. The physical principles underlying musical instruments, room acoustics, and the human ear. Analysis, reproduction, and synthesis of musical sounds. No previous knowledge of physics is assumed. C-L: Music 36. One course. *Lawson*

41, 42. Fundamentals of Physics. For students interested in majoring in physics; taken in the freshman year. Basic principles of physics, mainly classical, at a level similar to Physics 51, 52, but with emphasis on laying a foundation for further study. Lecture, reci-

tations, and laboratory. Closed to students having credit for Physics 51, 52. Prerequisites: consent of Director of Undergraduate Studies; Mathematics 31 and 32 may be taken concurrently. One course each. *Palmer or Roberson*

51, 52. General Physics. Basic principles of general physics treated quantitatively. Designed for students entering medicine, engineering, and the sciences. Not open for credit to students who have completed Physics 41, 42. Students planning to major in physics should enroll in Physics 41, 42 in their freshman year. Prerequisites: Mathematics 31 and 32 or equivalents; Mathematics 32 may be taken concurrently with Physics 51. One course each. *Staff*

55. Introduction to Astronomy. The evolving theory of the physical universe. Cosmological models, galaxies, stars, interstellar matter, the solar system, and experimental techniques and results. Several observatory sessions. One course. *Herbst or Kolena*

100. Introduction to Modern Physics. Survey of modern physics including relativity and the quantum physics of atoms, nuclei, particles, and quarks. Not applicable toward a major in physics. Prerequisites: Physics 51, 52 or 41, 42 and Mathematics 103 (may be taken concurrently). One course. *Han*

105. Introduction to Astrophysics. Basic principles of astronomy treated quantitatively. Cosmological models, galaxies, stars, interstellar matter, the solar system, and experimental techniques and results. Prerequisites: Mathematics 31 and Physics 51, 52 or consent of the instructor. One course. *Kolena*

143. Optics and Modern Physics. Intended as a continuation of Physics 41, 42. Classical wave and ray optics. Special relativity. Introduction to quantum physics. Prerequisites: Physics 41, 42 or 51, 52 and Mathematics 103 (may be taken concurrently). One course. *Evans or Goshaw*

Physics 41, 42 or 51, 52 or equivalents, and Mathematics 103 or equivalent are prerequisites to all of the following courses.

171. Electronics. Elements of electronics including circuits, transfer functions, solid-state devices, transistor circuits, operational amplifier applications, digital circuits, and computer interfaces. Lectures and laboratory. One course. *Fortney*

176. Thermodynamics and Kinetic Theory. Thermodynamics, kinetic theory, and elementary statistical mechanics. One course. *Behringer*

181. Introductory Mechanics. Newtonian mechanics at the intermediate level, Lagrangian mechanics, linear oscillations, special relativity. Prerequisite: Mathematics 111 or equivalent (may be taken concurrently). One course. *Roberson*

182. Electricity and Magnetism. Electrostatic fields and potentials, boundary value problems, magnetic induction, energy in electromagnetic fields, Maxwell's equations, introduction to electromagnetic radiation. Prerequisite: Mathematics 111 or equivalent. One course. *Evans*

185, 186. Modern Optics. Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications to modern optical devices. Second semester will emphasize nonlinear interactions, optical modulators, lasers, and spectroscopy. Lecture and laboratory projects. Note: the following cross-listing applies only to Physics 185. C-L: Electrical Engineering 213. One course each. *Guenther or Hacker*

For Seniors and Graduates

211. Modern Physics. Fundamental concepts of quantum theory applied mainly to study of atomic structure and spectra, and to statistical physics. Prerequisites: Physics 181 and Mathematics 111. One course. *Herbst*

215. Introduction to Quantum Mechanics. Fundamental postulates; wave mechanics and elementary applications; operators, eigenvalues, and eigenfunctions; angular momentum and rotations; spin and coupling of angular momenta; perturbation theory, transition rates, and selection rules; identical particles; applications. Prerequisites: Physics 181 and 211; Mathematics 111 and 114 (may be taken concurrently). One course. *Robinson*

217S, 218S. Advanced Physics Laboratory and Seminar. Experiments involving the fields of electricity, magnetism, heat, optics, and modern physics. One course each. *Meyer*

225, 226. Elementary Investigations. Training in the laboratory and library methods of physical research. Qualified students may conduct elementary investigations under the supervision of a member of the staff. One course each. *Staff*

240. Computer Applications to Physical Measurement. Hardware and software techniques for computer-assisted data acquisition, display, and control in the modern experimental environment. Theory and application of discrete signal analysis including digital filters, Z-transform, and fast Fourier transform. Lecture and laboratory. Prerequisite: Physics 171 or consent of instructor. One course. *Fortney*

244. Nuclear and Particle Physics. Current ideas and models in nuclear and particle physics. Experimental methods; nuclear structure; nuclear reactions; families of elementary particles; quarks and gluons; weak interactions. Prerequisite: Physics 211. One course. *Oh*

COURSES CURRENTLY UNSCHEDULED

33. Energy: Principles, Problems, Alternatives

102. Applications of Modern Physics in Medicine

106. Topics in Astrophysics

212. Modern Physics

214. Introduction to Solid-State Physics

THE MAJOR

Students majoring in physics are prepared for work in industrial and governmental laboratories. They are also prepared for graduate work in physics or for the study of medicine.

Students planning to major in physics should enroll in Physics 41, 42 in their freshman year. They should also arrange to complete the necessary mathematics as soon as possible.

For the A.B. Degree

Prerequisites. Physics 41, 42 or 51, 52, or equivalents; Mathematics 31, 32, 103, 111, or equivalents; and one additional course at the 100 or 200 level.

Major Requirements. Physics 143, 171, 176, 181, and two other courses in physics at the 100 or 200 level.

For the B.S. Degree

Prerequisites. Physics 41, 42 or 51, 52, or equivalents; Mathematics 31, 32, 103, 111, or equivalents; and one additional course at the 100 or 200 level.

Major Requirements. Physics 143, 171, 176, 181, 182, 211, and two other courses in physics at the 100 or 200 level, at least one of which must be a laboratory course. Students planning graduate study in physics are urged to take one additional elective in physics and one in mathematics.

Honors

The department offers upperclassmen the possibility of being associated with research conducted in the department. This work may lead to graduation with distinction. See the section on honors in this bulletin.

Polish

For courses in Polish, see Slavic Languages and Literatures.

Political Science (PS)

Professor Kornberg, *Chairman*; Associate Professor Johns, *Director of Undergraduate Studies*; Professors Aldrich, Ascher, Barber, Bates, Braibanti, Fish, Holsti, Horowitz, Hough, Leach, Paletz, Price, and Spragens; Associate Professors Eldridge, Lange, and McKean; Assistant Professors Bianco, Booth, Canon, Entman, Gillespie, Grant, Grieco, Kitschelt, Lomperis, and Roberts; Professors Emeriti Ball, Cleaveland, Cole, Grzybowski, Hall, Hallowell, Kulski, and Simpson; Adjunct Associate Professor O'Barr

A major is available in this department.

Courses in political science for undergraduates are offered in four fields: (A) American government, politics, and public administration; (B) comparative government and politics; (C) political theory and methodology; and (D) international law, relations, and politics. In the course descriptions below the field within which the course falls is indicated by the appropriate letter symbol (A, B, C, or D) after the title of the course. In each field, a course numbered at the 90 level serves as an introduction both to the study of political science and to the subject matter and approaches of the field, and middle and upper level courses and seminars (numbered at the 100 and 200 levels respectively) consider particular aspects and topics within the field. In addition, independent study under faculty supervision enables students to explore topics of special interest. See below, following the course descriptions, for the listing of courses by fields, information on internships, and requirements for the major and honors.

INTRODUCTORY COURSES

The following courses introduce the study of political science, and each serves as the basic course in one of the four fields of the discipline. Students ordinarily will take at least one of these courses before proceeding to more advanced courses. Some advanced courses may require a particular introductory course as a prerequisite.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

91. The American Political System (A). Theory and practice of American government and politics; federal-state relations; the separation and interrelationships of the executive, legislative, and judicial branches of government; judicial review; the role of political parties and public opinion; the formulation and execution of domestic and foreign policy; civil liberties. One course. *Staff*

91D. The American Political System (A). Same as Political Science 91 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Staff*

92. Comparative Politics (B). Topics include problems of conceptualization and analysis; foundations of politics under democratic, authoritarian, and totalitarian regimes; theories of development and underdevelopment; revolution and collective violence; the role of elites, such as the military. C-L: Comparative Area Studies. One course. *Staff*

92D. Comparative Politics (B). Same as Political Science 92 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Staff*

93. Elements of International Relations (D). The nature of international politics, the analysis of national power, the instruments of foreign policy, and the controls of state behavior. One course. *Staff*

93D. Elements of International Relations (D). Same as Political Science 93 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Staff*

94. Contemporary Political Ideologies (C). Liberalism, socialism, Marxism and its variants, fascism, contemporary democratic theory. One course. *Staff*

94D. Contemporary Political Ideologies (C). Same as Political Science 94 except instruction is provided in two lectures and one small discussion meeting each week. One course. *Staff*

OTHER UNDERGRADUATE COURSES

100. Duke University Overseas Semester. This number represents course credit for political science courses taken either in Duke University Summer Session Study Abroad Programs or in Duke University exchange programs with overseas universities.

A. Duke Summer Program in Berlin (B).

B. Duke Summer Program in Brazil (B).

C. Duke Summer Program in Zimbabwe/Botswana (B, D).

D. Duke Summer Program in Cambridge University (A, B).

Two courses.

104. Politics and Literature (C). The enduring questions of politics and political philosophy illustrated in Western literature: historical, literary, and philosophical analysis. One course. *Booth or Gillespie*

106. International Security (D). Contemporary and future threats. Regional conflicts, the United States-Soviet strategic balance, theories of deterrence and defense, prospects for arms control. One course. *Staff*

107. Comparative Environmental Policies (B). Comparative analysis of environmental problems and policies in politically diverse industrialized nations including the United States, Russia, and Japan. C-L: Comparative Area Studies and Public Policy Studies 107. One course. *McKean*

108. The American Presidency (A). The presidency and its impact on the American political system. One course. *Canon or Paletz*

109. State and Local Government Today (A). Problems in state, county, and city government. One course. *Leach*

111. Contemporary Japanese Politics (B). Introduction to political change in postwar Japan. Foundations of the modern industrial state, electoral politics, policy making and bureaucracy, defense, foreign policy, and foreign trade. C-L: Comparative Area Studies. One course. *McKean*

112S. Shaping the News (A). C-L: Public Policy Studies 186S. One course. *Barber*

113. International Political Economy (D). The interplay between politics and economics in international trade, money, investment, and technology flows among advanced capitalist societies, between developed and developing countries, and between capitalist and socialist countries. One course. *Grieco*

114. United States Foreign Policy and Latin America (D). The postwar period: the Alliance for Progress, counter-insurgency, human rights, Cuba. Particular attention to the United States response to Latin American democracies, dictatorships, and revolutionary movements. C-L: Comparative Area Studies. One course. *Staff*

- 115. Politics and Society in West Germany (B).** Industrialization, democratization, and fascism in Germany; social structure, political institutions, and political culture; selected public policies; West Germany in the world economy and in world politics. C-L: Comparative Area Studies. One course. *Kitschelt*
- 116S. The Small Democracies in Europe (B).** Institutions and policy-making in selected small European democracies. Consensus, efficiency, and economic survival of small democracies. One course. *Kitschelt*
- 117. Comparative Government and Politics: Selected Countries (B).** The political system of one or more countries from a comparative perspective. One course. *Staff*
- 118. American Constitutional Development (A).** Prerequisite: Political Science 91 or 91D or consent of instructor. One course. *Fish*
- 120. International Conflict and Violence (D).** Nature and processes of international conflict and violence with emphasis on contemporary instances of violence in international affairs. Consideration of restraints on violence. One course. *Eldridge*
- 121. International Organization (D).** Political aspects of military and economic organizations at the global and regional levels of the international system. One course. *Grieco*
- 122. Modern International Politics (D).** The major problems in contemporary international affairs with attention to superpower politics, specific regional concerns, and the problems associated with the emergence of a new international economic order. One course. *Eldridge*
- 123. Introduction to Political Philosophy (C).** The nature and enduring problems of political philosophy, illustrated by selected theorists in the Western political tradition. One course. *Staff*
- 125. Strategies of Comparative Analysis (B).** See C-L: Interdisciplinary Course 125; also C-L: Anthropology 125, Comparative Area Studies, History 137, and Sociology 125. One course. *Staff*
- 126. Theories of Liberal Democracy (C).** Critical discussion of classic theorists, such as Locke, Rousseau, Mill, and Madison, and contemporary theories of liberal democracy. One course. *Grant or Spragens*
- 127. Law and Politics (A).** Nature and functions of law; Anglo-American legal institutions; the process of judicial decision making; and the relationships among judges, lawyers, legislators, and administrators in the development of public as well as private law. One course. *Fish*
- 128. Congress and the Presidency (A).** Policy making in the executive and legislative branches of the United States government, with particular attention to intragovernmental relations. One course. *Bianco or Canon*
- 129. Political Participation (A).** The motives, methods, and results of the activities of individuals and groups and of social movements. C-L: Women's Studies. One course. *Paletz*
- 131. Introduction to American Political Thought (C).** Basic elements in the American political tradition as developed from its English roots to the present. One course. *Grant or Leach*
- 132. Politics of Asia (B).** The impact of nationalism, development, and revolution on traditional Asian society and its emerging states. C-L: Comparative Area Studies. One course. *Lomperis*
- 135. Political Development of Western Europe (B).** The development of the modern political systems of Britain, France, Germany, and other European countries; the

spread of capitalism, the emergence of mass democracy and the rise of the welfare state. Contemporary developments examined in historical and theoretical perspective. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*

136. Comparative Government and Politics: Western Europe (B). Modern political institutions and processes of European democracies: political parties, interest groups and parliaments; regional, religious and class divisions; political participation and mobilization; relationships of state, society and economy; political, social and economic change in postwar Europe. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*

137. Political Behavior in Elections (A). An introduction to voting and elections in the United States, with emphasis on presidential nomination and election procedures, characteristics of the American electorate, and theories of voting behavior in presidential and congressional elections. One course. *Aldrich or Bianco*

138. Quantitative Political Analysis I (C). Basic applications of statistical methods to the analysis of political phenomena. Emphasis on research design, descriptive and inferential statistics, and use of computers. Not open to students who have had or are enrolled in Political Science 236, Economics 138, Mathematics 53 or 117, Psychology 117, Public Policy Studies 112 or 222, or Sociology 132, 133, or 293. One course. *Staff*

140. Law and Society (C). The evolution of the competing political philosophies of law. Consideration of a variety of standpoints for examining current debates about the nature of law and rights. One course. *Booth*

144S. American Political Thought since the Gilded Age (C). The Progressive period and the recurring themes of contemporary debate. Attempts to refurbish or develop alternatives to the dominant liberal tradition. The ideological roots of black, feminist, and conservative protest. One course. *Spragens*

145. Political Analysis for Public Policy Making (A). See C-L: Public Policy Studies 114. One course. *Ascher or Entman*

146. American Legislative Behavior (A). An introduction to the American legislative process, with specific focus on the U.S. Congress. Emphasis on legislative rules and procedures, congressional elections, and the behavior of legislators in their representative and policy-making roles. One course. *Bianco or Canon*

147. International Environmental Politics and Policies (D). Environmental issues in developing countries in the context of the North-South problem; transboundary pollution problems and international trade; problems of the global commons (such as the deep sea, the upper atmosphere, genetic resources); international organizations and environmental policy. One course. *McKean*

148. The Politics of American Business and Government in the International Economy (D). Major political forces which affect United States business operations abroad and the responses to the forces by business and the United States government. One course. *Grieco*

149. United States and East Asia (D). American military intervention in China, Korea, and Vietnam; contemporary United States relations with Japan, China, and other Asian nations; new trends and sources of tension in East Asia and the Pacific. C-L: Comparative Area Studies. One course. *McKean*

150. The Individual and Society: The Classical View (C). Ancient political philosophy and drama emphasizing the case of Socrates. Readings include Plato's *Republic*, *Apology*, and *Crito*; Aristophanes' *The Clouds*; Sophocles' *Antigone*. One course. *Booth or Grant*

151. Introduction to Latin American Politics (B). Historical and cultural context of political institutions and behavior, the role of traditional and emerging groups and forces,

political instability and the decision-making process. C-L: Comparative Area Studies. One course. *Staff*

152. Political Thought of the American Founding (C). Debate over the Constitution. Readings include Declaration of Independence, Articles of Confederation, the Constitution, the *Debates over the Constitution*, the *Federalist Papers*, and selections of Antifederalist writings. One course. *Grant*

153, 154. Politics and the Media of Mass Communication 153 (B), 154 (A). Analysis of the nature, organization, and products of the mass media (especially the movie, television, and newspaper industries) as they affect the political systems, political processes, institutions, and people of the United States and other nations. Open to juniors and seniors. It is desirable but not required that students taking 153 continue with 154. With consent of the instructor, students who have not taken 153 may enroll in 154. C-L: Film and Video and Women's Studies. One course each. *Paletz*

155. The Politics and Economics of Developing Areas (B). Theories of the development process, including those based on modernization, international political economy, and Marxian analysis. Emphasis on agrarian societies, politics, economics of rural change, and peasant revolutions. Particular focus on Africa. C-L: Comparative Area Studies. One course. *Bates*

156. Space, Weapons, and War (D). Space, weapons, and war in international relations. Offense, defense, and space technology. One course. *Roberts*

157. Foreign Policy of the United States (D). Sources of American foreign policy, containment, international economic policy, deterrence, arms control, and disarmament. Prospects for the future. Emphasis on the period since World War II. One course. *Holsti*

158. Space and International Relations (D). A comparative and historical survey of the developments regarding space, emphasizing the relations between states and the international system. The concept of space from fantasy to historical reality, focusing on the role of science, industry, and the administrative state. One course. *Roberts*

159. Ambition and Politics (C). A theoretical examination of the role of ambition in politics, including works by or on Plato, Plutarch, Machiavelli, Shakespeare, Madison, Tocqueville, and Hitler. One course. *Gillespie*

160. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy (D). C-L: Anthropology 109, Comparative Area Studies, History 109, Interdisciplinary Course 109, Religion 156, and Sociology 175. One course. *Staff*

161S. Comparative Government and Politics: Africa (B). Nationalism, nation building, and problems of development in sub-Saharan Africa. C-L: Comparative Area Studies. One course. *Bates or Johns*

163. Gender, Politics, and Policy: The Third World Case (B). A comparative analysis of precolonial, colonial, and postcolonial politics and distribution of political power between women and men. C-L: Comparative Area Studies and Women's Studies. One course. *O'Barr*

165. Government and Politics of the Soviet Union (B). Analysis of the Soviet political system, emphasizing the sources of stability and instability and the responsiveness of its policies. Literature on the non-Soviet world (notably the United States) will be included. C-L: Comparative Area Studies. One course. *Hough*

166. Soviet Foreign Relations (D). Nature of relations with other states. Determinants and formulation of foreign policy. C-L: Comparative Area Studies. One course. *Hough*

167. International Law (D). Elements of international law, particularly as interpreted and applied by the United States; rights and duties of states with respect to recogni-

tion, state territory and jurisdiction, nationality, diplomatic and consular relations, treaties, treatment of aliens, pacific settlement of disputes, international regulation of the use of force, and collective responsibility. Not open to students who have had Political Science 227. One course. *Staff*

169. Politics in Revolutionary China (B). Political process in China since 1949, with emphasis on ideological shifts in the Cultural Revolution and the post-Mao era. Party politics, leadership, economic organization, thought reform, mass mobilization, and socialist transformation. China as an emerging world power. C-L: Comparative Area Studies. One course. *McKean*

171. Politics of South African Apartheid (B). The South African political system in the twentieth century, with particular attention to the economic and ethnic roots of racial conflict. United States-South African relations. C-L: Comparative Area Studies. One course. *Johns*

173S. Political Economy of World Food Problems (B). Changing policies toward food production and distribution. Topics include American agricultural policy, international food and famine aid, and Third World agricultural development strategies. C-L: Comparative Area Studies. One course. *Johns*

174S. Political Biography (A). Nature of politics as revealed in the life histories of individuals. Readings in single biographies and autobiographies, but with some comparative work. Students project their autobiographies toward possible political futures. One course. *Barber*

176A. Perspectives on Food and Hunger (B). See C-L: Interdisciplinary Course 120A; also C-L: Comparative Area Studies. One course. *Johns*

176B. Perspectives on Food and Hunger (B). See C-L: Interdisciplinary Course 120B; also C-L: Comparative Area Studies. One course. *Johns*

177, 178. Contemporary Social and Political Development in the Islamic World (B). An analysis of contemporary events in Iran, Afghanistan, Pakistan, Iraq, and the Arabian Peninsula; the political manifestation of Shi'ia and Sunni Islam; security in the Arab world and its relationship to global politics. Prerequisite: for 178, 177 or consent of instructor. C-L: Comparative Area Studies. One course each. *Braibanti*

180. Media in Comparative Perspective (B). See C-L: Interdisciplinary Course 182; also C-L: Comparative Area Studies and Sociology 182. One course. *Paletz or Smith*

184. An Introduction to Canada and Canadian Issues (B). See C-L: Interdisciplinary Course 184; also C-L: Canadian Studies, Comparative Area Studies, Economics 184, History 184, and Sociology 184. One course. *Cahow*

186. Political Leadership (A). The development, characteristics, and impact of political leaders. Biographical and collective studies are considered primarily from a psychological perspective. One course. *Barber*

187. Politics and the Libido (A). Effects of the libido on elite and mass political activities. Government regulation of sex-inspired behavior. C-L: Women's Studies. One course. *Paletz*

188. The Psychology of Political Symbols (A). The role of symbolic political issues in determining public attitudes and voting behavior. Symbolic political issues such as "law and order," pornography, and prohibition; distinguished from public welfare issues such as employment policies. One course. *McConahay*

189, 190. Internship (A). Open to students engaging in practical or governmental work experience during the summer or a regular semester. To enroll, a student must obtain

the approval of the Director of Undergraduate Studies. A faculty member in the department will supervise a program of study related to the work experience, including an analytical paper. One course each. *Johns*

191, 192. Independent Study (A,B,C, or D). Directed reading and research. Open only to qualified juniors by consent of the Director of Undergraduate Studies and of the supervising instructor. One course each. *Staff*

193, 194. Independent Study (A,B,C, or D). Directed reading and research. Open only to seniors by consent of the Director of Undergraduate Studies and of the supervising instructor. One course each. *Staff*

195. Comparative Political Behavior in the United States and Canada (B). Similarities and differences in political environments and their impact on political institutions and processes. C-L: Canadian Studies and Comparative Area Studies. One course. *Kornberg*

196 (I-IV). American University Washington Semester (A). This number represents transfer course credit for courses taken at American University in the Washington Semester Program: Washington Semester Seminar I, Washington Semester Seminar II, Washington Semester Internship, and an elective or research project. If any of the above courses at American University are taken outside the political science department, approval must be obtained beforehand from the Director of Undergraduate Studies of the appropriate Duke department in order to obtain transfer credit. Four transfer credits. Four courses.

199. Special Topics in Government and Politics. Topics vary from semester to semester.

- A. American Government and Politics
 - B. Comparative Government and Politics
 - C. Political Theory
 - D. International Relations
- One course. *Staff*

For Seniors Only

197S-198S. Senior Honors Thesis. Preparation and writing of research paper; group meetings to present topics and for discussion. Open only to senior political science majors in the honors program. See section on honors under description of the major. Two courses. *Staff*

200S. Senior Seminars. Open also, if places are available, to qualified juniors who have earned a 3.0 average and obtained the consent of the instructor.

- A. American Government and Politics
 - B. Comparative Government and Politics
 - C. Political Theory
 - D. International Relations
- One course. *Staff*

For Seniors and Graduates*

201S. Problems in International Security (D). Major security issues. Prerequisite: a course in international relations or American foreign policy. One course. *Staff*

203S. Politics and the Media of Mass Communication (A). Analysis of crucial aspects of the media-politics relationship. Media's effects on political socialization, public opinion, political participation, pluralism, power, and authority. Government's impact on the media. Prerequisite: consent of instructor. C-L: Film and Video. One course. *Paletz*

*The following courses may be taken by juniors who have earned a 3.0 average and obtained the consent of the instructor.

204S. Ethics in Political Life (C). Ethical issues arising in the conduct of political vocations and activities. C-L: Public Policy Studies 204S. One course. *Spragens*

207S. American Constitutional Interpretation (A). Development of the Constitution of the United States through Supreme Court decisions. One course. *Fish*

208S. Analyzing the News (A). See C-L: Public Policy Studies 240S. One course. *Entman*

209. Problems in State Government and Politics (A). One course. *Leach*

211S. Current Problems and Issues in Japanese Politics (B). Sources of strength and weakness in the Japanese economy, the rise of new issues and strains in postindustrial society, changes in the party system and decision-making process, the possible transfer of power, the challenge of Japan's new world role. C-L: Comparative Area Studies. One course. *McKean*

212S. Domestic Structures and Foreign Policies of Advanced Democratic States (D). The influence of democratic institutions on the national-security and foreign-economic policies of advanced industrialized states. C-L: Comparative Area Studies. One course. *Grieco*

213S. Theories of International Political Economy (D). Comparison and assessment of traditional and modern theories in terms of their logical and empirical validity. One course. *Grieco*

215S. Philosophical Bases of Political Economy and Society (C). Central questions in the relationship between economy and society through an examination of the classical texts of political economy. Themes include: democracy and capitalism, the world economy and foreign policy, critiques of capitalism from the left and right. Readings drawn from Adam Smith, Karl Marx, J. M. Keynes, Joseph Schumpeter, Milton Friedman, and others. One course. *Booth*

216S. Evolution of European Marxism (C). The central themes in the evolution of European Marxism: socialist thought prior to Marx; the writings of Marx and Engels. The themes are articulated in: Russian Marxism; Soviet Communism and its Marxist critics; the rethinking of Marx's political economy, the theory of the state, and concepts of class consciousness in the works of twentieth-century European Marxists. C-L: Comparative Area Studies. One course. *Booth*

218. Political Thought in the United States (C). American political thought through the Civil War period. The Founders and their European antecedents. Debates over the Constitution, slavery, and the Union. One course. *Gillespie or Grant*

220S. Problems in International Politics (D). Prerequisite: one course in international relations, foreign policy, or diplomatic history. One course. *Holsti or Hough*

221S. International Institutions and the World Political Economy (D). Examination of theory concerning the role of international institutions in facilitating economic cooperation among advanced democratic states. Investigation of the impact on international economic relations of such multilateral institutions as the International Monetary Fund, the World Bank, the General Agreement on Tariffs and Trade, and the International Energy Agency. One course. *Grieco*

222S. Seminar: Modern Political Classics (C). How social scientists think about politics. Works influential in shaping contemporary political science, written by political scientists, economists, and sociologists. Topics include democracy, capitalism, socialism, voting, and collective action. One course. *Staff*

223. Ancient Political Philosophy (C). Intensive analysis of the political philosophy of Plato, Aristotle, and other ancient theorists. One course. *Gillespie or Grant*

- 224S. Modern Political Theory (C).** A historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. The rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism and utilitarianism. One course. *Grant or Spragens*
- 225. Topics in Comparative Government and Politics: Western Europe (B).** Topics vary: the development of mass democracy and the welfare state; political and electoral participation and mobilization; social movements and political change; center-periphery conflicts; government and bureaucratic institutions and their relationships to society; the modern welfare state and political economy. C-L: Comparative Area Studies. One course. *Kitschelt or Lange*
- 226S. Theories of International Relations (D).** An overview with applications to political-military and political-economic empirical problems. One course. *Grieco*
- 227. International Law (D).** Theory and practice of international law: rights and duties of states with respect to recognition, state territory and jurisdiction, treaties, settlement of disputes, and other topics. C-L: Comparative Area Studies. One course. *Staff*
- 228S. Nineteenth- and Twentieth-Century Political Philosophy (C).** Topics in nineteenth- and twentieth-century political philosophy, considering such authors as Hegel, Marx, Nietzsche, Dostoevsky, Heidegger, Malraux, and Camus. One course. *Booth or Gillespie*
- 229S. Contemporary Theory of Liberal Democracy (C).** One course. *Spragens*
- 230S. Introduction to Positive Political Theory (C).** Basic concepts of political economy, theory of preference and choice, social choice theory, and decision and game theory. One course. *Aldrich, Bates, or Bianco*
- 231S. Crisis, Choice, and Change in Advanced Democratic States (B).** Contributions of Marx, Weber, and Durkheim toward analysis of modern democracies. Examination of selected contemporary studies using these three perspectives to highlight processes of change and crisis. Unsettling effects of markets upon political systems, consequences of bureaucratic regulation, and transformation of sources of solidarity and integration in modern politics. C-L: Comparative Area Studies. One course. *Kitschelt*
- 232. Political Economy: Theory and Applications (C).** Selected topics. C-L: Comparative Area Studies. One course. *Lange*
- 233S. Quantitative Political Analysis II (C).** Intermediate statistical methods, especially linear regression, for political science research. Emphasis on assumptions and interpretations of results. Prerequisite: Political Science 138 or 236 or equivalent. One course. *Staff*
- 234S. Political Economy of Development: Theories of Change in the Third World (B).** Alternative approaches to political, economic, and social change in Latin America, Africa, and Asia. C-L: Anthropology 234S, Comparative Area Studies, History 234S, Interdisciplinary Course 234S, and Sociology 234S. One course. *Bates, Bergquist, Fox, Gereffi, or Smith*
- 235S. Comparative Development of Islam (B).** Comparative development of Islam in Indonesia, Malaysia, Pakistan, India, North Africa, and sub-Saharan Africa. A comparative analysis of the resurgence of Islam as a religious, political, and cultural force. One course. *Braibanti*
- 236. Statistical Analysis (C).** Introduction to statistics in political research, emphasizing research design, descriptive and inferential statistics, and use of computers. Not open to students who have had or are enrolled in Political Science 138, Economics 138, Mathematics 53 or 117, Psychology 117, Public Policy Studies 112 or 122, or Sociology 132, 133, or 293. One course. *Staff*

237S. Comparative Public Policy (B). Introduction to methods, concepts, and theories of comparative public policy analysis. Substantive policies examined in the course vary each semester and may include economic, industrial, social, and civil rights policies. C-L: Comparative Area Studies. One course. *Kitschelt*

240. American Political Behavior (A). One course. *Staff*

242S. Comparative Law and Policy: Ethnic Group Relations (B). Various approaches to the reduction of conflict in deeply divided societies, primarily in Asia and Africa, with secondary attention to Western Countries. The nature of ethnic identity, the sources of group conflict, and the forms and patterns it takes. Methods of analyzing social science materials and utilizing them for the design of policies, laws, and institutions. Prerequisite: consent of instructor. C-L: Comparative Area Studies and Law 572. One course. *Horowitz*

243S. Political Applications of Game Theory (C). Theory of games as a tool to understand strategic behavior of political actors. Applications to legislative politics, international cooperation, bureaucratic behavior. One course. *Bianco*

245. Ethics and Policy Making (C). Not open to students who have taken Public Policy Studies 116. See C-L: Public Policy Studies 223. One course. *Rapaport*

246S. Political Hypocrisy and Idealism (C). The cases for and against hypocrisy in political and social life. The concept of authenticity as the alternative to hypocrisy. Selections from Machiavelli, Shakespeare, Rousseau, Nietzsche, and others. One course. *Grant*

248. The Politics of the Policy Process (A). See C-L: Public Policy Studies 219. One course. *Entman*

249. Comparative International Development and Technology Flow (B). Analysis of social, political, and economic development in Third World countries. The internal problem of maintaining political systems and the external problem of adapting intermediate or appropriate technologies. C-L: Comparative Area Studies. One course. *Braibanti*

251S. The American Presidency (A). One course. *Paletz*

253S. Comparative Government and the Study of Latin America (B). Current literature on major themes of Latin American politics. C-L: Comparative Area Studies. One course. *Staff*

255. Political Sociology (B). See C-L: Sociology 255. One course. *Smith or Tiryakian*

256S. Arms Control and National Security Policy (D). The evolution of nuclear weapons and strategy and of global defense policy toward the Soviet Union and other adversaries; the arms control process and nonproliferation. Prerequisite: consent of instructor. One course. *Lomperis*

259S. Low Intensity Conflict and the Lessons of Viet Nam (D). The Viet Nam conflict and comparative cases; implications for Western interventions in the Third World. Prerequisite: consent of instructor. C-L: Comparative Area Studies. One course. *Lomperis*

260S. The Tradition of Political Inquiry (C). Past and present problems, goals, presuppositions, and methods. One course. *Spragens*

261. Politics and the Future (D). The projection of possible political orders: the effects of changing resources, technologies, and values on mankind's ability to govern. One course. *Lomperis*

262S. International Communism (D). C-L: Comparative Area Studies. One course. *Hough*

263S. Methods of Political Science (C). The relation between theory and evidence; research designs for the comparative analyses of historical and statistical evidence. One course. *Roberts*

267S. Policy Making in International Organizations (D). See C-L: Public Policy Studies 267S. One course. *Ascher*

270S. Fundamentals of Political Economy (C). Application of economic reasoning to the study of politics. Analysis of campaigns and elections; legislatures; and the regulation of industries. C-L: Economics 270S. One course. *Aldrich, Bates, or Bianco*

275. The American Party System (A). An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, recent foreign policy and party alignments, and the controversy over party government. One course. *Kornberg*

277. Comparative Party Politics (B). The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. C-L: Comparative Area Studies. One course. *Kornberg or Lange*

279S. Political Protest and Collective Mobilization (B). Survey of theories, methods, and empirical studies of political mobilization outside institutional channels; protest behavior and strategies; responses of the state to these challenges; the success of collective mobilization. Emphasis on comparative analyses of protest in advanced industrial democracies. One course. *Kitschelt*

280S. Comparative Government and Politics: Sub-Saharan Africa (B). Politics and government in selected African states, with particular attention to the problems of decolonization and modernization in the postindependence period. Prerequisite: Political Science 161S or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

282S. Canada (B). See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Canadian Studies, Comparative Area Studies, History 282S, and Sociology 282S. One course. *Cahow*

283S. Congressional Policy Making (A). Lawmaking and oversight of the executive branch by the U.S. Congress. Committee, party, executive, and interest group roles. C-L: Public Policy Studies 283S. One course. *Bianco or Canon*

284S. Public Policy Process in Developing Countries (B). See C-L: Public Policy Studies 284S; also C-L: Comparative Area Studies. One course. *Ascher*

286S. Judicial Administration (A). Organization, case processing, and management of courts with emphasis on federal appellate courts. Prerequisite: Political Science 127. C-L: Law 534. One course. *Fish*

293. Federalism (B). Theoretical and operational aspects of federal systems of government, focusing on the United States and Canada. C-L: Canadian Studies and Comparative Area Studies. One course. *Leach*

299. Advanced Topics in Government and Politics. Topics vary from semester to semester.

- A. American Government and Politics
 - B. Comparative Government and Politics
 - C. Political Theory
 - D. International Relations
- One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

110. The Americas: A Survey of the Forces Shaping the Hemisphere (B)

143. Politics of Liberties (A)

172. Political Economy of Global Natural Resources (B)

175. Political Parties and Legislatures in Western Democracies (B)

214S. The Politics of Scarcity (B)

POLITICAL INTERNSHIPS

The department administers an internship program, primarily in Washington, DC, for political science majors and interested nonmajors. Students participate by qualifying for a position obtained by the department or by acquiring their own relevant employment, with or without compensation. Course credit can be obtained by enrolling in Political Science 189 or 190 and writing an analytical paper. Potential applicants should contact the Internship Director, Louise Walker (327 Perkins), at any time, but preferably in the fall semester.

POLITICAL SCIENCE COURSES BY FIELDS

Political science courses for undergraduates are offered in four fields. The courses in each of the four fields are listed below; in the course descriptions above, the field in which each course falls is indicated by the appropriate symbol (A, B, C, or D). Students majoring in the department must complete at least one course in each of three fields.

American Government, Politics, and Public Administration (A). Political Science 91, 91D, 100D, 108, 109, 112S, 118, 127, 128, 129, 137, 143, 145, 146, 154, 174S, 186, 187, 188, 189, 190, 191,* 192,* 193,* 194,* 196, 197S-198S,* 199A, 200S A, 203S, 207S, 208S, 209, 240, 248, 251S, 275, 283S, 286S, 299A.

Comparative Government and Politics (B). Political Science 92, 92D, 100A, 100B, 100C, 100D, 107, 110, 111, 115, 116S, 117, 125, 132, 135, 136, 151, 153, 155, 161S, 163, 165, 169, 171, 172, 173S, 175, 176A, 176B, 177, 178, 180, 184, 191,* 192,* 193,* 194,* 195, 197S-198S,* 199B, 200S B, 211S, 214S, 225, 231S, 234S, 235S, 237S, 242S, 249, 253S, 255, 277, 279S, 280S, 282S, 284S, 293, 299B.

Political Theory and Methodology (C). Political Science 94, 94D, 104, 123, 126, 131, 138, 140, 144S, 150, 152, 159, 191,* 192,* 193,* 194,* 197S-198S,* 199C, 200S C, 204S, 215S, 216S, 218, 222S, 223, 224S, 228S, 229S, 230S, 232, 233S, 236, 243S, 245, 246S, 260, 263S, 270S, 299C.

International Law, Relations, and Politics (D). Political Science 93, 93D, 100C, 106, 113, 114, 120, 121, 122, 147, 148, 149, 156, 157, 158, 160, 166, 167, 191,* 192,* 193,* 194,* 197S-198S,* 199D, 200S D, 201S, 212S, 213S, 220S, 221S, 226S, 227, 256S, 259S, 261, 262S, 267S, 299D.

THE MAJOR

Requirements. Eight courses in political science including (1) at least one course in each of three fields; (2) at least one course at Duke at the 200 level; and (3) no more than three cross-listed courses originated outside the Department of Political Science. Such courses cannot be used to meet the major requirements in both political science and also in another department. (Cross-listed courses appear in the preceding listing without descriptions.)

Of the eight required political science courses, at least six must be taken at Duke to meet major requirements, five if the student: (1) is transferring courses from a year-long approved study abroad program; or (2) transferred to Duke after completing two undergraduate years at another institution; or (3) completed one semester at an approved study abroad program and one semester at the Washington Semester Program at American University. For the purpose of this requirement courses in the Washington Semester Program at American University will be counted as transfer courses.

Suggested Work in Related Disciplines. Several courses in such disciplines as anthropology, economics, history, philosophy, psychology, public policy, religion, and sociology are desirable.

Honors. The department offers students majoring in political science a senior honors program, by successful completion of which a participant achieves graduation with distinction in political science. The central feature and requirement of the program is the honors thesis which the student prepares under faculty supervision. Students who have attained at least a 3.3 grade average overall and a 3.5 average in political science courses

*If subject matter is appropriate to the field.

may enter the program by submitting, prior to the end of the second semester of the junior year, a research proposal to the departmental honors committee and also obtaining consent of a faculty member to supervise the proposed thesis. In the first semester of the senior year, accepted students take Political Science 197S with emphasis on research methods. The following semester they take Political Science 198S during which their thesis is written, presented orally, and evaluated by the honors committee. Graduation with distinction is awarded to students receiving a grade of A- or better. Further information may be obtained from the chairman of the honors committee or the Director of Undergraduate Studies.

Psychology (PSY)

Professor R. Erickson, *Chairman*; Associate Professor Holland, *Director of Undergraduate Studies*; Professors Alexander, Carson, Coie, Costanzo, Diamond, C. Erickson, W. G. Hall, Hasher, Martin Lakin, Lockhead, Rubin, Staddon, M. Wallach, Wing, and Wolbarsht; Associate Professors Day, Eckerman, and Roth; Assistant Professors Kremen and Putallaz; Professors Emeriti Borstelmann and Kimble; Adjunct Professors Brodie, Crovitz, W. C. Hall, Maddox, Schiffman, Thompson, L. Wallach, and Weiss; Adjunct Associate Professors Casseday, George, Goldstein, Marsh, and Spenner; Adjunct Assistant Professors Cooper, B. Erickson, Musia Lakin, Lochman, and Swartzwelder; Lecturers Curry, Sawyer, and Sheppard

A major is available in this department.

The *General Courses*, coded (G), apply as indicated. The *Biological Bases of Behavior* area, coded (B), includes courses on the nervous system, the learning process, motivation, neurochemistry, hormones, and other biological factors in their relationship to behavior. The *Cognitive Psychology* area, coded (C), includes the topics of sensation and perception, cognition, learning, language, memory, and psycholinguistics. *Developmental Psychology*, coded (D), emphasizes the developmental aspects of all psychological processes such as sensory and motor behavior, cognition, children's thinking and reasoning, and social behavior. Courses in the *Personality/Social Psychology* area, coded (P), ultimately bear on the questions of human character and behavior, both normal and abnormal. These include personality, social and abnormal issues, along with strategies for the prevention of deviance.

GENERAL COURSES

11. Introductory Psychology (G). Biological bases of behavior, psychological development, cognitive psychology, personality, abnormal behavior, and social psychology. Designed as a broad introduction to psychology for nonmajors as well as majors; not required for the major. Students are expected to participate as subjects in three to six hours of psychological research. One course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

103. Biological Bases of Behavior: Introduction and Survey (B). Physiological, developmental, and evolutionary approaches to behavior. Sensory and cognitive processes, sleep, pain, emotion, hunger, and thirst as well as maternal and sexual behavior patterns. Prerequisite: none, but an introductory course in psychology or biology is desirable. One course. *C. Erickson*

105. Developmental Psychology: Introduction and Survey (D). Theory and research on growth and behavior from infancy to adolescence. One course. *Putallaz*

107. Cognitive Psychology: Introduction and Survey (C). Overview of cognitive processes including pattern recognition, concept formation, attention, memory, imagery, language, problem solving, and thinking. Emphasis both empirical and theoretical. Prerequisite: none, but Psychology 11 desirable. One course. *Day*

- 108. Personality and Social Behavior: Introduction and Survey (P).** The determinants of socially significant human behavior—those residing in the person, those that are the product of interpersonal context, and those resulting from the interaction of both sources. Formative as well as contemporary influences considered. One course. *Carson*
- 110. Applied Psychology (P).** Applications of psychology to problems of personnel selection, industrial efficiency, advertising, and selling. Prerequisite: Psychology 117 or equivalent. One course. *Wing*
- 111. Learning and Adaptive Behavior (B, C).** Principles of instrumental learning in animals and humans. Prerequisite: none, but some knowledge of quantitative science desirable. C-L: Zoology 111. One course. *Staddon*
- 112. Sensation and Perception (C).** Principles of organization of perceptual systems, including sensory systems (vision, audition, proprioception, and chemical senses); pattern recognition; perceptual anomalies; attention; methods of measurement. One course. *Lockhead*
- 113. Research Methods in Psychology (B, C).** General issues in the conduct of inquiry about mind and behavior. The nature and role of theory construction, measurement, and the logic of statistical and mathematical analyses. Specific research methods, experimental and nonexperimental. Illustrations drawn primarily from cognitive and biological psychology. Prerequisite: Psychology 103 or 107. One course. *Holland*
- 114. Personality (P).** Representative theories of personality from Freud to the present, emphasizing problems of normal personality structure, dynamics, development, and assessment. One course. *Alexander or Kremen*
- 115. Introduction to Learning Theory (C).** Simple processes of learning, memory and motivation, primarily nonhuman, from the perspectives of associationism, ethology, and cognitive science. One course. *Holland*
- 116. Social Psychology (P).** Problems, concepts, and methods in the study of social interaction and interpersonal influence. C-L: Sociology 106 and Women's Studies. One course. *Costanzo or George*
- 117. Statistical Methods (G).** Elementary statistical techniques and their application to the analysis and interpretation of social science data. Theory of inference is stressed. Not open to students who have had Mathematics 136, Statistics 200, or equivalent. C-L: Sociology 133. One course. *Staff*
- 118. The Psychology of Individual Differences (B, C, D, G, P).** Nature and causes of individual and group variations in intelligence, special abilities, social and emotional characteristics. Prerequisite: Psychology 117 or equivalent. One course. *Wing*
- 119. Abnormal Psychology (P).** Disordered behavior and constructive personality change viewed in interpersonal and social context for purposes of understanding normal and abnormal personality development and functioning. One course. *Carson*
- 120. Comparative Psychology (B).** A survey of animal behavior from the psychologist's perspective. Analysis of several specific behaviors: such as navigation, communication, social organization. One course. *Holland*
- 121. Health Psychology (P).** The role of behavioral variables in the etiology, pathophysiology, and treatment of cardiovascular disease and endocrine disorders; psychoneuroimmunology; chronic pain; and life style behaviors with health consequences such as smoking and eating disorders. One course. *Thompson*
- 123. Human Learning and Memory (C).** The phenomena of human learning and memory both of simple and complex materials. Developmental issues, from childhood

to old age. Relationship between affect and memory, and breakdowns in memory produced by disease and injury. Applications to education in consumer behavior. One course. *Hasher*

124. Human Development (D). Biological, behavioral, and cultural perspectives and approaches. Evaluation of competing paradigms. Taught by multidisciplinary team. C-L: Human Development, Interdisciplinary Course 124, and Sociology 124. One course. *Maddox and staff*

126. Behavior and Neurochemistry (B, P). The role of brain chemicals (neurotransmitters, peptides, and hormones) in behavior. Hypotheses addressing the neurobiology of mental disorders. Prerequisite: Psychology 103. One course. *Cooper*

130. Psychosocial Aspects of Human Development (D). The connectedness of societal, behavioral, and biological components of normal development from childhood through old age; society as the context in which individuals develop over the lifespan. Introductory work in anthropology, psychology, or sociology recommended. C-L: Human Development, Interdisciplinary Course 180, and Sociology 169. One course. *Martin Lakin and Maddox*

134. Psychology of Language (C). Psychological "reality" of linguistic structures, language and cognition, biological bases, animal communication, language pathologies, nonverbal communication, language versus music, linguistic universals, and bilingualism. Everyday language phenomena (e.g., slips of the tongue) as well as the experimental and theoretical literature. Prerequisite: Psychology 107 desirable. C-L: Linguistics. One course. *Day*

136. Advanced Developmental Psychology (D). Issues, concepts, and methods in psychological development, e.g., comparative social development, social cognition, adolescence. Prerequisite: Psychology 105 or consent of instructor. One course. *Staff*

137. Adolescence (D). Adolescent development, including identity formation, intelligence, sexuality, peer and parent relationships, vocational choices, drugs, and psychopathology. Theory and empirical findings. One course. *Goldstein*

140S. Research Methods in Developmental Psychology (D). Prerequisite: Psychology 105 or consent of instructor. One course. *Eckerman or L. Wallach*

141S. Tests and Measurements (B, C, D, G, P). Test methods used by psychologists to measure and evaluate mental processes. Prerequisite: Psychology 117 or equivalent. One course. *Wing*

142S. Child Observation (D). Observation of children in the group setting of the University Preschool and Primary Program. Aspects of personality, social development, and child-adult relationships. Open only to junior and senior psychology majors with consent of instructor. One course. *Musia Lakin*

143S. Experimental Methods in Cognitive Psychology (C). Human cognition; language, memory, problem solving, and other higher mental processes. Prerequisite: Psychology 107 or 112. One course. *Hasher, Lockhead, or Rubin*

145S. Experimental Approaches to Personality (P). Methods applied to personality research. Prerequisite: one course in psychology. One course. *M. Wallach or Wing*

147S. Experimental Social Psychology (P). Group dynamics, attitude change, and interpersonal perception. Prerequisite: Psychology 116. One course. *Staff*

148S. Experimental Methods in Sensation and Perception (C). Experimental approaches to basic phenomena of perception as determined by conditions in the external situation and the person: biological and psychological. Prerequisite: Psychology 112 or consent of instructor. One course. *Lockhead*

149L. Methods in Behavioral Neurobiology (B). Research in neural bases of behavior using simple biological systems as models for more complex behavior. Laboratory experience in experimental methodologies. Observational techniques in study of natural behaviors and neurophysiological recording and stimulation. Prerequisites: Psychology 103 or background in biology and consent of instructor. One course. *W. G. Hall and Phifer*

150S. Hormones and Behavior (B, P). The endocrine system and hormones in aggressive, sexual, and emotional behavior. Prerequisites: Psychology 103 and consent of instructor. C-L: Women's Studies. One course. *Izard*

151S-152S. Child Clinical Psychology (D, P). Theories of clinical intervention with children and families; research on prediction of adult disorders from childhood problems, evaluation of therapy and epidemiological data. Practicum with children in schools, coupled with in-class training. 151S: fall semester, one course. 152S: spring semester, half course. Prerequisites: Psychology 105 and 119. Variable credit. *Coie*

154S. Education, Children, and Poverty (D). Psychological hypotheses concerning the roles of preschool intervention programs, improved quality of resources, teacher expectancy effects, and enhancement of pupil self-confidence, in relation to the goal of improved cognitive competence for poverty background children. Criteria for defining competence, such as scores on psychometric intelligence tests, performing on Piagetian tasks, and development of specific skills. Interpretations concerning intelligence and cognitive deprivation in poor children in light of relevant psychological evidence. Prerequisite: one course in psychology or consent of instructor. One course. *M. Wallach*

157S. Social Development of Children (D). The study of the child's social self; specifically, how children's social behavior changes developmentally and what factors influence the development of that behavior. One course. *Coie or Putallaz*

158S. Psychophysiology (B). A survey of experimental and clinical literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stimulation, reaction time, and attention. Emphasis on the electrophysiology of conditioning and learning. One course. *Marsh*

159S. Biological Psychology of Human Development (B, D). Multidisciplinary perspectives bearing on key processes in human development from infancy through old age; the way that biological and psychological processes act together in normal and pathological behavior and development. Clinical case material and video tapes. Preference given to senior psychology majors and to students in the Program in Human Development. Prerequisite: consent of instructor. One course. *Thompson*

160S. Human Memory (C). Classical and modern literature, data, and theories relating to mechanisms of information processing, storage, and retrieval. One course. *Staff*

161S. Advanced Modern Learning Theory (C). Selected topics in the data and theory of basic processes of learning, memory, and motivation in animals and humans. Emphasis on the nature of theory construction and evaluation, and the relation of current perspectives to older ones. Prerequisite: Psychology 115 or consent of instructor. One course. *Holland*

162S. Clinical Issues: Conceptions, Techniques, and Problems of Professional Clinical Psychology (P). Assessment of personality and psychopathology. Consultation and psychotherapy in individuals, groups, family, and organizational contexts. Research on clinical questions. Intended for those contemplating advanced graduate or professional study and careers in clinical psychology, counseling, psychiatry, social work, or cognate fields. Prerequisites: junior or senior status and consent of the instructor. One course. *Martin Lakin*

163S. Stress and Coping (P). Psychological theory and empirical work on stress and coping, with an emphasis on post-traumatic stress. Open only to psychology majors. Prerequisite: consent of instructor. One course. *Roth*

164S. Psychology of Women (P). The psychology of women in this country: development, including sex differences, separation and individuation, and achievement; sexuality; sex-roles; mental health problems particularly salient to women; cultural influences on female development; and views within the field of psychology about women. Prerequisite: consent of instructor. C-L: Women's Studies. One course. *Staff*

165S. Neurobiology of Learning and Memory (B). Readings in the neurophysiological and neurochemical underpinnings of the memory process. Current and classical research and review articles. Prerequisites: Psychology 103 and consent of instructor. One course. *Swartzwelder*

166S. Comparative Neurobiology (B). The evolution and functional organization of the vertebrate brain. A study of the original papers of the pioneers in comparative anatomy. Prerequisite: consent of instructor. One course. *Diamond and W. C. Hall*

167S. Brain Mechanisms of Behavior (B, C). General physiological principles of brain organization in relation to behavioral processes from sensation to concept formation. Discussions of original readings from seminal papers in the early nineteenth century to the present. One course. *R. Erickson*

169S. Eating Behavior and Disorders (B, P). The interaction of taste and smell with obesity, anorexia, and nutritional status including that of the elderly. Prerequisite: consent of instructor. One course. *Schiffman*

170S. A-R, U-Z. Selected Problems (G). New courses not yet in the bulletin are designated as 170S or 270S depending on their level. Since all faculty offer these courses, their contents vary accordingly. Different courses indicated by the letter. One course. *Staff*

171T. A-R. Tutorials (G). Small group discussions about influential books and articles in psychology. The availability of tutorials, their content, and the instructors will be announced before registration. Pass/fail grading only. Prerequisite: consent of instructor. Half course. *Staff*

191, 192, 193, 194. Independent Study (G). Directed reading and research. 191, 192: junior year fall, spring; 193, 194: senior year fall, spring. Prerequisites: consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

For Advanced Undergraduates and Graduates

200. Advanced Neuroscience I (B). Prerequisite: Psychology 103. See C-L: Interdisciplinary Course 200; also C-L: Zoology 200. One course. *Cant and McClay*

201. Advanced Neuroscience II (B). Prerequisite: Interdisciplinary Course 200, Psychology 200, or Zoology 200. See C-L: Interdisciplinary Course 201. One course. *R. Erickson and W. G. Hall*

203S. Sensation and Perception (C). Classical and current concepts and methods. Prerequisite: consent of instructor. One course. *Lockhead*

204S. Great Ideas in Psychology (G). Ideas in psychology drawn from various content areas (e.g., perception, personality, motivation, biological bases, social, cognitive, developmental, learning, clinical) and various methodological approaches (e.g., experimental, introspection, observation, interview, longitudinal, simulation). Prerequisites: must be a junior or senior psychology major and have consent of instructor, or have graduate status. One course. *Day*

206S. Stress and Health (B, C). Intensive study of the processes of stress and coping; the relationship between stress, health, and illness. The psychophysiology of stress emphasizing the nervous, cardiovascular, and endocrine systems; stress and affective disorders, especially depression. Prerequisite: consent of instructor. One course. *Thompson*

210S. Cognition (C). Schematic view of cognitive psychology plus intensive study of two to three specific research topics such as forms of representation, individual differences, and problem solving models. Emphasis on alternative experimental and theoretical approaches. Prerequisites: Psychology 107 and consent of instructor, or graduate status. One course. *Day*

212S. Human Memory (C). Same as 160S, except additional term paper required. One course. *Rubin*

214S. Development of Social Interaction (D, P). Major concepts and methods pertaining to early social development, emphasizing human social behavior and a developmental psychobiological approach. Prerequisite: consent of instructor. One course. *Eckerman*

215S. Cognitive Development (C, D). Intensive critical evaluation of major approaches to the development of knowledge, including those of Piaget, Thomas Kuhn, Vygotsky, Eleanor Gibson, Kohlberg, and others. Prerequisite: consent of instructor. One course. *L. Wallach*

217S. Advanced Social Psychology (P). The psychology of interpersonal influence and control; the cognitive and social factors affecting the perception of persons and social action; the dynamics of interpersonal relations and relationship formation and change; the contribution of individual differences to social behavior. Applications in environmental psychology, social psychology and law, and organizational psychology. Prerequisite: consent of instructor. One course. *Costanzo*

219S. Physiological Foundations of Psychology (B, P). Structure and function of the nervous system as related to problems of sensory-motor processes, learning, motivation, and memory. Prerequisite: consent of instructor. One course. *C. Erickson and R. Erickson*

220S. Psycholinguistics (C). Selected topics such as neurolinguistics, linguistic versus pictorial representation, individual differences, oral versus written expression, language and personality, and the language-thought interaction. Prerequisites: Psychology 134 and consent of instructor or graduate status. One course. *Day*

234S. Advanced Personality (P). Selected topics of current interest concerning empirical research on personality. Strategies for the definition of research questions and the evaluation of research progress. Prerequisite: consent of instructor. One course. *M. Wallach*

238S. Psychophysiology (B). Same as 158S except additional term paper required. Prerequisite: consent of instructor or graduate student status. One course. *Marsh*

261S. Advanced Modern Learning Theory (C). Same as 161S, except additional term paper required. Prerequisite: consent of instructor or graduate status. One course. *Holland*

266S. Comparative Neurobiology (B). Same as 166S except additional term paper required. C-L: Anatomy 266S. One course. *Diamond and W. C. Hall*

267S. Brain Mechanisms of Behavior (B, C). Same as 167S except additional term paper required. Prerequisite: consent of instructor or graduate status. One course. *R. Erickson*

270S. A-R, U-Z. Selected Problems (G). New courses not yet in the bulletin are designated as 170S or 270S depending on level. Since all faculty offer these courses, their contents vary accordingly. Different courses indicated by the letter. One course. *Staff*

273S. Statistical Principles in Experimental Design (G). The problems of scientific inference; methods of data analysis and issues in experimental design. Prerequisite: consent of instructor or graduate status. One course. *Roth*

285S. Developmental Psychobiology (B, D). The development of motivation, learning, and reward mechanisms and their neurobiological basis. Animal studies and some human work. Prerequisites: Psychology 103, an upper level course in psychobiology, and consent of instructor. One course. *W. G. Hall*

286S. Biological Basis of Hearing (B, C). Anatomy and physiology of the auditory system; neural mechanisms for localization of sound, frequency discrimination and discrimination of temporal patterns of sound such as speech; disorders of hearing. Prerequisite: consent of instructor or graduate status. One course. *Casseday*

289S. Psychology of Prevention (P). Concepts of prevention and mental health promotion; community psychology and social systems; epidemiology and prediction of disorder; intervention strategies; evaluation of prevention trials; and ethical and cultural issues. Prerequisite: consent of instructor or graduate status. One course. *Coie*

COURSES CURRENTLY UNSCHEDULED

139. Psychobiology of Motivation (B,D)

153S. Child Rearing: Theories, Research, Realities (D)

155S. Perinatal Behavior (B,D)

230S. Social Behavior of Animals (B,D,P)

231S. Parent-Child Interaction (D)

255S. Perinatal Behavior (B,D)

THE MAJOR

For the A.B. Degree

Eight courses in psychology are required for the major, which is devised to provide depth and breadth, a small group course in psychology, and familiarity with the quantitative methods involved in psychology. For breadth, the student is required to take two *Introductory and Survey* courses including: (1) either 103 (Biological Bases of Behavior) or 107 (Cognitive Psychology), and (2) either 105 (Developmental Psychology) or 108 (Personality and Social Behavior). These *Introductory and Survey* courses define four areas of concentration in psychology as listed above. For depth, the student is required to take at least two courses in one of these areas in addition to the introductory course in that area of concentration. For instruction in small groups, the student is to take at least one seminar (number 140S and above, including 200-level courses). It is advisable that this seminar be in the student's area of concentration. For quantitative methods, the student is to take one of the following: Mathematics 136; Sociology 133; Statistics 200; or Psychology 117 (none of which count as one of the eight required courses in psychology). For purposes of the major, Sociology 106 is the equivalent of Psychology 116, and Sociology 133 is the equivalent of Psychology 117. A student guidebook describing the curriculum in detail is available from the Director of Undergraduate Studies.

For the B.S. Degree

As for the A.B. degree, with the following additions: eligibility for Mathematics 32 or 34 plus six courses in at least two of the following departments: mathematics (100-level or above in addition to statistics requirement above) or computer sciences (100-level or above), chemistry, physics, and the biological areas: genetics, zoology, Biology 14, and Botany 103L, 180, 205, 227, 228, 237L, 268, 269, 285S, 287, 293L.

Independent Study

A program of individualized readings or an empirical research project may be carried out by arrangement with a faculty supervisor and enrollment in Psychology 191-194.

A written plan of the program must be approved by the supervisor and the Director of Undergraduate Studies. Credit for 191-194 may be recorded either as pass/fail or by means of letter grades. At most only one of these independent study courses may count toward the area of concentration requirement, and only two may count toward the major.

Honors

Any student majoring in psychology with an overall grade point average of 3.0 and a grade point average of 3.3 in psychology courses may be a candidate for graduation with distinction in psychology. Recommendation for this honor is made by a faculty committee which evaluates a thesis submitted by the candidate and administers an oral examination. Candidates typically enroll in independent study courses (191-194) during one or more semesters, often as early as the junior year, although enrollment in independent study is not a precondition of candidacy. All eligible students are encouraged to carry out independent study and to secure the sponsorship of a faculty supervisor.

Public Policy Studies (PPS)

Professor Cook, *Chairman*; Professor Kuniholm, *Director of Undergraduate Studies*; Professors Ascher, Barber (political science), Clotfelter, Fleishman (law), Gillis, Horowitz (law), Hough (political science), Ladd, Pearsall (engineering), and Price (political science); Associate Professors Behn, Lipscomb, McConahay, and Stack; Assistant Professors Durning, Entman, and Shetty; Professor of Health Policy Analysis and Clinical Policy Eddy; Professors of the Practice Broder, Geller, Harris, Kaiser, Stubbing, and Yaggy; Adjunct Professors Jackson and Owen; Adjunct Associate Professor Magat; Visiting Professors Coles and Healy; Visiting Associate Professor Rapaport; Instructors Ott and Storck; Lecturer Payne; Visiting Lecturer Stevens

A major is available in this department.

Courses in public policy are open to all students providing that any prerequisites are met.

55. Analytical Methods for Public Policy Making. Basic concepts of analytical thinking including quantitative methods for assessing the probabilities of outcomes and appraising policy alternatives. Illustrated by problems faced by busy decision makers in government, business, law, medicine. One course. *Lipscomb or Shetty*

107. Comparative Environmental Policies. See C-L: Political Science 107; also C-L: Comparative Area Studies. One course. *McKean*

110. Economic Analysis for Public Policy Making: Microeconomic and Non-probabilistic Models. Application of microeconomic analysis to public policy areas, including agriculture, housing, taxation, and income redistribution. (Not open to students who have taken Economics 149.) Prerequisite: Economics 52 or equivalent. One course. *Ladd, Lipscomb, or Shetty*

112. Statistics and Public Policy. Uses and limitations of statistical methods, including experimentation, for monitoring and evaluating public policies. Not open to students who have taken Economics 138, Mathematics 117, Psychology 117, or Statistics 10. Prerequisite: Public Policy Studies 55. One course. *Lipscomb or Shetty*

114. Political Analysis for Public Policy Making. Analysis of the political and organizational processes which influence the formulation and implementation of public policy. Alternative models. C-L: Political Science 145. One course. *Durning or Entman*

116. Policy Choice as Value Conflict. Theoretical and practical problems in decision making in relation to conflicts of value and of interest. The manifestation of norms deriving

from professional ethics, ideology, law, and other sources in such policy issues as welfare, environmental management, and national defense. One course. *Ott or Payne*

145D. Leadership, Policy, and Change. Ethical and practical problems of leadership, including motivation, organizational morale, and strategies for large-scale change. Historical and modern case studies, literary examples, and political and psychological theory. One course. *Ott and Payne*

146S. Leadership and Judgment. Theoretical and experiential foundation for the exercise of judgment and leadership in policy making. Readings, in-class exercises, and a major leadership project within either the Duke or Durham community. Prerequisite: consent of instructor. One course. *Ott*

151S. Administration of Justice. Analysis of policy problems and conflicts involved in the operation of the criminal justice system. One course. *Staff*

152S. Administration of Justice, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 151S. Variable credit. *Staff*

154S. Journalism and Public Policy. Policy problems and conflicts involved in applying First Amendment principles to print and electronic journalism. Topics include libel, obscenity, privacy, national security, fair trial, and antitrust. Prerequisite: consent of instructor. One course. *Staff*

155S. Journalism and Public Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 154S. Variable credit. *Broder and Kaiser*

157S. Health Policy. Analysis of health care problems and policies. One course. *Staff*

158S. Health Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 157S. Variable credit. *Staff*

159. State and Local Public Policy. How state and local governments pay for public services. Financing education and transportation programs, the use of municipal bonds for capital projects, and the design of intergovernmental aid programs. State and local tax policy. Prerequisite: Public Policy Studies 110, Economics 149, or consent of instructor. C-L: Economics 159. One course. *Ladd*

161S. State and Local Public Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 159S. Variable credit. *Staff*

163S. Telecommunications Policy and Regulation. Broadcast policies, the rise of cable television, spectrum allocation and authorization, and developments in common carrier telecommunications. One course. *Geller and staff*

164S. Telecommunications Policy and Regulation, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 163S. Variable credit. *Geller*

167S. International Policy. Relationships among organizations and agencies involved in international political and economic affairs, focusing on selected problems of international policy. Prerequisite: Political Science 93. One course. *Ascher*

168S. International Policy, Summer Internship. Pass/fail grading only. Half course or one course. Prerequisite: Public Policy Studies 167S. Variable credit. *Staff*

175S. The Palestine Problem and United States Public Policy. Identification of Arab and Zionist perceptions, alternatives available to American decision makers, interest group pressures on United States policies, historical analysis as a means to improve public policy. C-L: Comparative Area Studies and History 159S. One course. *Kuniholm*

176S. American Communities: A Photographic Approach. A documentary approach to the study of American communities through individual photographic projects centered around a community of the student's choosing. Prerequisite: consent of instructor. C-L: Film and Video. One course. *Harris*

177S. Advanced Documentary Photography. An advanced course for students who have taken Public Policy Studies 176S or have had substantial experience in documentary field work. Students complete an individual photographic project and study important works within the documentary tradition. Prerequisite: Public Policy Studies 176S or consent of instructor. One course. *Harris*

180S. Writing for the Media. Workshop on writing news stories, editorials, and features for the print media. Prerequisite: consent of instructor. One course. *Staff*

185. American Diplomacy from the Kennedy Administration to the Present. C-L: History 185. One course. *C. Davis or Kuniholm*

186S. Shaping the News. C-L: Political Science 112S. One course. *Barber*

190. Internship. For students working in a public agency, political campaign, or other policy-oriented group under the supervision of a faculty member. Pass/fail grading only. Prerequisites: prior consent of Assistant Director for Internships, Placement, and Alumni and Director of Undergraduate Studies. One course. *Staff*

191, 192. Independent Study. Directed reading and research. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for seniors. One course each. *Staff*

195S. Selected Public Policy Topics. One course. *Staff*

For Seniors and Graduates

204S. Ethics in Political Life. See C-L: Political Science 204S. One course. *Spragens*

217. Microeconomics and Public Policy Making. Consumption and production theory, welfare economics, theories of collective choice, market structures and regulation, and nonmarket decision making. Not open to students who have taken Public Policy Studies 110. One course. *Clotfelter*

218. Macroeconomic Policy. Survey of macroeconomic theory and analysis of policies designed to reduce unemployment, stimulate economic growth, and stabilize prices. Conventional monetary and fiscal instruments, employment policies, and new policies designed to combat inflation. C-L: Economics 218. One course. *Staff*

219. The Politics of the Policy Process. The formulation of public policies, substantive policies in a variety of contexts from local government to international affairs; the role of legislatures, interest groups, chief executives, and the bureaucracy in defining alternatives and in shaping policy from agenda formulation to implementation. Not open to students who have taken Public Policy Studies 114. C-L: Political Science 248. One course. *Entman*

221. Decision Analysis for Public Policy Makers. Methods for structuring decision dilemmas and decomposing complex problems, assessing the probabilities of uncertain consequences of alternative decisions, appraising the decision maker's preferences for these consequences and for re-examining the decision. Not open to students who have taken Public Policy Studies 55. One course. *Behn*

222. Data Analysis for Public Policy Makers. Sampling theory, Bayesian statistics, and regression analysis. Examples from problems in health care, transportation, crime, urban affairs, and politics. Not open to students who have taken Public Policy Studies 112. One course. *Cook or McConahay*

223. Ethics and Policy Making. Normative concepts in politics, liberty, justice, and the public interest: historical and philosophical roots, relationship to one another and to American political tradition, and implications for domestic and international problems. Not open to students who have taken Public Policy Studies 116. C-L: Political Science 245. One course. *Rapaport*

231. Quantitative Evaluation Methods. Problems in quantifying policy target variables such as unemployment, crime, and poverty. Experimental and nonexperimental methods for evaluating the effect of public programs, including topics in experimental design, regression analysis, and simulation. Prerequisite: Public Policy Studies 222 or equivalent. One course. *Cook or McConahay*

232. Microeconomics: Policy Applications. Cost benefit analysis of public programs. Public utility regulation, pollution regulation, hospital rate setting, regulation of product safety. Quantitative methods and microeconomic theory for analysis of both normative and positive aspects of economic policy. Prerequisites: Public Policy Studies 110 or 217 or Economics 149 and familiarity with regression analysis or concurrent enrollment in Public Policy Studies 231. C-L: Economics 232. One course. *Ladd*

236S, 237S. Public Management I and II: Managing Public Agencies. 236S: operations management, information and performance, personnel management, public sector marketing. 237S: organizational strategy, organizational structure and design, leadership and motivation, labor negotiations. Prerequisite: for 237S, Public Policy Studies 236S. One course each. *Behn, Durning, or Yaggy*

238S. Public Budgeting and Financial Management. Fund accounting for government; techniques of financial analysis, including break-even analysis, cost accounting, cash-flow analysis, and capital budgeting; and governmental budgeting, including the budgetary process and reforms, and the budget crunch in the public sector. One course. *Stubbing*

240S. Analyzing the News. Research seminar on political messages and effects of media. Methods and findings of content analysis, survey research, critical theory, semiology; research project integrating these approaches. C-L: Political Science 208S. One course. *Entman*

241. Reporting the American People. Critical analysis of the sources of information the media rely upon in reporting opinion and policy preferences: opinion polls, bellwethers, informed elites. Includes the design and execution of a public opinion poll on a topic of local or national interest. One course. *McConahay*

245S. Leadership Tutorial. Analysis of techniques, personal qualities, and organizational factors that help or hinder effective leadership. Practical experience in evaluation of leadership efforts. Prerequisite: Public Policy Studies 145D or consent of instructor. One course. *Payne*

250S. Policy, Philanthropy, and the Arts. Democratic and aesthetic values in relation to past and present patterns of public, corporate, and philanthropic support for the arts. The uses of art criticism and political theory in evaluating subsidies, grants, tax incentives, and censorship. One course. *Payne*

254. Transportation Planning and Policy Analysis. Prerequisite or corequisite: Civil and Environmental Engineering 116 or consent of instructor. See C-L: Civil Engineering 216. One course. *Pas*

257. United States Policy in the Middle East. From World War II to the present with a focus on current policy options. C-L: Comparative Area Studies. One course. *Kuniholm*

264S. Research Seminar: Topics in Public Policy I. Selected topics. One course. *Staff*

267S. Policy Making in International Organizations. Emphasis on international financial institutions such as the World Bank and the International Monetary Fund. C-L: Political Science 267S. One course. *Ascher*

268. Federal Tax Policy. Structure, incidence, and economic effects of major federal taxes. Special attention to problems of inflation, income definition, distortions, savings, and investment. C-L: Economics 268 and Law 518. One course. *Clotfelter or Schmalbeck*

270S. Humanistic Perspectives on Public Policy. Modes of inquiry into aspects of social life important to policy makers but beyond the normal reach of social science. Reading from James Agee, Robert Coles, Eudora Welty, James Baldwin, George Eliot, and others. Prerequisite: consent of instructor. One course. *Coles and Payne*

272. Resource Economics and Policy. Prerequisite: introductory course in economics or consent of instructor. C-L: Forestry and Environmental Studies 270. One course. *Hyde*

278. Human Service Bureaucracies. Schools, prisons, courts, welfare agencies: decision making, implementation, the impact of work practices on clients. The future of street-level bureaucracy. One course. *Stack*

283S. Congressional Policy Making. See C-L: Political Science 283S. One course. *Bianco or Canon*

284S. Public Policy Process in Developing Countries. Policy-making patterns in less developed countries; examples from Latin America, Africa, and Asia. C-L: Comparative Area Studies and Political Science 284S. One course. *Ascher*

286S. Economic Policy Making in Developing Countries. Fiscal, monetary, and exchange rate policies in less developed countries; issues in public policy toward natural resources and state-owned enterprises. Prerequisite: Public Policy Studies 110 or Economics 149. C-L: Comparative Area Studies and Economics 286S. One course. *Gillis*

290. Glasgow Seminar in Public Policy. The large theoretical problems of public policy (e.g., justice, equality, liberty); the making and implementation of policy in specific areas (e.g., economic, urban, social); comparative analysis of Europe's communist countries and how their political systems differ from those of the United States and Britain. (Taught in Scotland.) Prerequisites: Public Policy Studies 55, 110, 112, 114, 116, and consent of Director of Undergraduate Studies, who may waive requirements. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

118S. Ethical Dilemmas and Social Policy

166. Child Policy in the United States

178S. Visual Language and Policy Choice

256. The Economics of Health Care

INTERNSHIP COURSES

The internship courses provide students with an opportunity to develop a basic understanding of one or more public policy areas, to apply that understanding in a job during the summer, and to return to the classroom to build on this knowledge and experience. Normally, students take a two-course sequence to receive credit for the field experience requirement of all public policy studies majors. Prior to participation in the internship program, all majors must have completed Public Policy Studies 55 and three of the four core courses (Public Policy Studies 110, 112, 114, or 116). This requirement may be waived by the Director of Undergraduate Studies for transfer students or others in unusual cir-

cumstances. Applications for enrollment in the internship program must be completed in the early fall through the Assistant Director of Internships, Placement, and Alumni. Stipends are usually provided for all public policy majors enrolled in an internship sequence that begins with any one of the following internship courses: Public Policy Studies 152S, 155S, 158S, 161S, 164S, or 168S.

All majors are encouraged to take an advanced follow-up course in the area of their summer internship.

THE MAJOR

The policy studies major is an interdisciplinary social science program designed to provide students with the skills, analytical perspectives, and descriptive information needed by policy analysts to deal effectively with major contemporary social problems. The course of study familiarizes the student with the kind of contribution each of several disciplines (political science, economics, social psychology, applied mathematics, history, and ethics) can make to policy analysis. Opportunities are provided, both in the classroom and through field experiences, for students to integrate this material and apply it to analyzing specific public policy issues.

Students majoring in public policy participate in a variety of learning experiences including seminars, lecture and discussion classes, individual study, policy workshops, and an internship. In addition, students are urged to participate actively in programs sponsored by the Institute of Policy Sciences and Public Affairs to supplement material covered in class. As a matter of policy, students are asked to evaluate teaching and course content and are provided both formal and informal opportunities to shape the program and curriculum.

Prerequisites. Economics 2 or 52, Political Science 91, and Public Policy Studies 55.

Major Requirements. Public Policy Studies 110, 112, 114, 116, plus three additional courses, one of which must be a 200-level course. A policy-oriented field experience approved by the Director of Undergraduate Studies is required. (See Internship Courses above.)

Religion (REL)

Professor Lawrence, *Acting Chairman*; Associate Professor Surin, *Director of Undergraduate Studies*; Professors Clark, Kort, Lincoln, Long, E. Meyers, Osborn, and Wintermute; Associate Professors Bland, Corless, McCollough, C. Meyers, Partin, and Peters; Assistant Professor Robinson; Lecturer Shows

A major is available in this department.

Study in the Department of Religion arises from the recognition that religion, although it takes many forms, is a constitutive element of human existence individually and collectively. The curriculum pursues the study of religion in two distinguishable ways: first, through the examination of the particulars of specific religious traditions; and, second, through theoretical studies of an analytic, comparative, and constructive nature.

Introductory courses (Religion 50, 51, 52, 53, 54, 55, 56, 57, 58, and 59) are open to all undergraduates. These courses also help fulfill distributional field requirements for the religion major. Courses at the 100 level are open to all undergraduates with the exception of those specially designated. Courses at the 200 level are open to upperclassmen with the consent of the instructor.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

50. The Old Testament. Historical, literary, and theological investigations. C-L: Judaic Studies. One course. *C. Meyers, E. Meyers, Peters, or Wintermute*

51. Introduction to Judaic Civilization. Continuity and change in the major periods of Judaism. C-L: Judaic Studies. One course. *Bland or E. Meyers*

52. The New Testament. Origins, development, and content of thought. One course. *Staff*

52D. The New Testament. Same as Religion 52 with discussion section included. One course. *Staff*

53. The Roman Catholic Tradition. A survey of the development of Roman Catholic theology and institutions from the second century to Vatican II. One course. *Clark*

55. Biblical Literature. A study of selected Old Testament and New Testament texts, their cultural context, and the relation within them of religious meaning to literary form. One course. *Staff*

56. The Black Religious Experience in America. From the slave period to the present. C-L: Afro-American Studies 56. One course. *Lincoln*

57. Introduction to Religions of Asia. Problems and methods in the study of religion, followed by a survey of the historical development, beliefs, practices, and contemporary significance of the Islamic religion and religions of south and east Asia. C-L: Comparative Area Studies. One course. *Corless, Lawrence, Partin, or Robinson*

58. Interpretations of Religion in Western Culture. Western religion as explained by contemporary sociologists, psychologists, anthropologists, and theologians. One course. *Bland or staff*

59. An Introduction to Christian Theology and Ethics. Analysis and interpretation of faith and practice. One course. *Kort, McCollough, or Osborn*

60. Ethical Issues in Twentieth-Century America. A critical examination of ethical themes, with special emphasis on public policy. For participants in the Twentieth-Century America Semester only. One course. *McCollough*

71A, 72A. Freshman-Sophomore Seminars: African and Asian Traditions. Topics and instructors to be announced. One course each. *Staff*

71C, 72C. Freshman-Sophomore Seminars: Analytic, Comparative, and Constructive Studies. Topics and instructors to be announced. One course each. *Staff*

101. Selected Studies in the Bible: Prophets. Analysis and interpretation of representative issues and personalities in the historical and prophetic books. C-L: Judaic Studies. One course. *Staff*

102. Selected Studies in the Bible: Writings. Analysis and interpretation of representative forms and ideas, with particular attention to wisdom literature and psalms. C-L: Judaic Studies. One course. *Staff*

105. Theology of the Old Testament. Emphasis upon history and eschatology, covenant, messianism, and wisdom. C-L: Judaic Studies. One course. *Wintermute*

106. Jesus and the Synoptic Gospels. The gospel tradition in the New Testament. One course. *Staff*

109. Women in the Biblical Tradition: Image and Role. C-L: Judaic Studies and Women's Studies. One course. *C. Meyers*

110. Archaeology and Art of the Biblical World. The material culture of ancient Palestine as it relates to the Hebrew Bible, the New Testament, and early Judaism. C-L: Comparative Area Studies. One course. *C. Meyers or E. Meyers*

115-116. Introduction to Biblical Hebrew. (Divinity School courses open to undergraduates with permission of the instructor.) Elements of phonology, morphology, and

syntax. Exercises in reading and writing Hebrew. 116: study of the weak verb; exegetical treatment of the Book of Jonah. C-L: Judaic Studies. Two courses. *Bailey*

123. Issues in Early Christian History. Theological, ecclesiastical, moral, and social issues in second- to fifth-century Christianity. Prerequisite: Religion 52 or 53 or 54 or 125 or consent of instructor. One course. *Clark*

125. Women and Sexuality in the Christian Tradition. A historical survey of Christian attitudes and practices from New Testament times to the present. C-L: Comparative Area Studies and Women's Studies. One course. *Clark*

128. The Background of Contemporary Christian Thought: 1918-1960. Theology of Karl Barth, Rudolf Bultmann, Paul Tillich, Karl Rahner, Reinhold Niebuhr, and others. One course. *Osborn*

129. Contemporary Christian Faith and Politics. One course. *Osborn*

131D. Principles of Archaeological Investigation. Supervised field work, visits to other excavations, introduction to ceramic chronology, numismatics, and other related disciplines. Excavation of a late Roman village in Galilee. Offered in Israel, only in the summer. C-L: Judaic Studies. One course. *C. Meyers or E. Meyers*

132D. Palestine in Late Antiquity. The history, literature, and archaeology of Roman Palestine with particular emphasis on Galilee in rabbinic and early Christian times. C-L: Judaic Studies. One course. *E. Meyers*

133. The Foundations of Post-Biblical Judaism. History, religion, and literature of Pharasaic and sectarian Judaism from the time of Ezra to Rabbi Judah. C-L: Judaic Studies. One course. *E. Meyers*

134. Jewish Mysticism. The main historical stages, personalities, texts, and doctrines from rabbinic to modern times. C-L: Comparative Area Studies, Judaic Studies, and Medieval and Renaissance Studies. One course. *Bland*

136. Contemporary Jewish Thought. Modern Jewish thought from Mendelssohn to the present, with particular reference to American thinkers. C-L: Comparative Area Studies and Judaic Studies. One course. *Bland or E. Meyers*

138. Political Leadership in the Black Church. Turner, Powell, King, Malcolm X, and others. C-L: Afro-American Studies 138. One course. *Lincoln*

140. Religions of India. Major religious traditions of the subcontinent: Hinduism, Buddhism, Jainism, and Islam. C-L: Comparative Area Studies. One course. *Lawrence or staff*

141. Religions of China and Japan. Traditional religion in China and Japan and its interaction with Sino-Japanese Buddhism. C-L: Comparative Area Studies. One course. *Corless*

142. Comparative Mythology. Nature and functions of religious myth in Judaism, Christianity, Islam, Hinduism, and Buddhism. C-L: Comparative Area Studies. One course. *Partin*

143. Mysticism. The mystical element of religion: Hinduism, Buddhism, Christianity, and Islam. C-L: Comparative Area Studies. One course. *Staff*

144. Black Cults and Sects in America. Cult-sect phenomena. C-L: Afro-American Studies 144. One course. *Lincoln*

145. Social Issues in Contemporary Hinduism. Emphasis on the caste system and reactions to it; topics include untouchability, religious roles of women, and institutional responses to famines and epidemics. C-L: Comparative Area Studies. One course. *Robinson*

148. Modern American Religious Cults. Children of God, Unification Church, Scientology, Feraferia, Transcendental Meditation, Krishna Consciousness, Bahai, and others. One course. *Partin*

149. Buddha and Buddhism. A systematic introduction to the origins and spread of Buddhist thought and practice. C-L: Comparative Area Studies. One course. *Corless*

151. Ethical Issues in Social Change and Public Policy. American moral tradition and factors in social change in the normative analysis of public policy, with a consideration of specific ethical issues. One course. *McCollough*

152. Islamic Mysticism. Sufism as an ascetical protest movement that affected the worldwide growth of Islam. C-L: Comparative Area Studies. One course. *Lawrence*

155. Ethical Issues in the Life Cycle. Human development viewed in religious, ethical, and psychological perspectives. One course. *McCollough*

156. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, History 109, Interdisciplinary Course 109, Political Science 160, and Sociology 175. One course. *Staff*

157. Bioethics in Comparative Contexts. Ethical approaches to health and illness from moral, religious, and philosophical perspectives in relation to economic, social, and political factors. C-L: Comparative Area Studies. One course. *McCollough*

158. Psychology and Religion. Contributions of major psychological theories to an understanding of religion, especially Christianity. One course. *Shows*

159. Ethical Issues in Health Care. A theological and comparative study of selected ethical issues in health policy: the profession of medicine, institutional organization and services, and medical practice. One course. *McCollough*

160, 161. Introduction to the Civilizations of Southern Asia. See C-L: Interdisciplinary Course 101, 102; also C-L: Anthropology 101, 102; Comparative Area Studies; and History 193, 194. One course each. *Fox and staff*

162, 163. Introduction to Islamic Civilization. See C-L: Interdisciplinary Course 162, 163; also C-L: Anthropology 147, 148; Comparative Area Studies; History 101G, 102G; and Medieval and Renaissance Studies. One course each. *Lawrence and staff*

164. History and Religions of North Africa. An introduction to the cultural patterns, social forces, and historical developments that have shaped North Africa and its major religious traditions. C-L: History 187 and Interdisciplinary Course 164. One course. *Lawrence*

170. Problems of Religious Thought. Analysis of uses of *know, true, mind, body, time, person, love, meaning*, in modern Western culture as introduction to religious reflection. One course. *Staff*

172. Religion and Tragedy. Influence of the Judaic-Christian religious tradition on the development of the tragic view of life. One course. *Staff*

174. Technology Assessment and Social Choice. See C-L: Engineering 174. One course. *Garg and McCollough*

186. Faith and Fiction in Victorian England. The relation of fiction to major religious and theological developments in England during the Victorian period. (Summer program in England.) Not open to students who have taken English 137. C-L: English 132. One course. *Staff*

187. Atmosphere and Mystery in Twentieth Century English Fiction. Narrative atmosphere in English fiction of this century in relation to beliefs about circumstances which

limit and determine the human world; religious significance of these beliefs. (Summer program in England.) One course. *Kort*

188. Recent Literature and Its Religious Implications. Religious elements in recent literature. One course. *Kort*

191, 192. Independent Study. For freshmen and sophomores with departmental approval. One course each. *Staff*

193, 194. Independent Study. For juniors and seniors with departmental approval. One course each. *Staff*

195A, 196A. Junior-Senior Seminars: African and Asian Traditions. Topics and instructors to be announced. One course each. *Staff*

195B, 196B. Junior-Senior Seminars: Jewish and Christian Traditions. Topics and instructors to be announced. C-L: Judaic Studies. One course each. *Staff*

195C, 196C. Junior-Senior Seminars: Analytic, Comparative, and Constructive Studies. Topics and instructors to be announced. One course each. *Staff*

197-198. Honors Research. Consent of the Director of Undergraduate Studies required. Two courses. *Staff*

For Seniors and Graduates

207, 208. Intermediate Biblical Hebrew. Grammar with reading and exegesis of Old Testament prose and poetry. Prerequisite: at least one year of Hebrew or consent of instructor. C-L: Old Testament 207, 208 and Judaic Studies. One course each. *Staff*

212. Policy Making and Theological Ethics. Relation of knowledge, power, and values in policy making; models of decision making in the policy sciences and their ethical implications. One course. *McCollough*

217. Islam in India. History and thought of major Indian Muslims from Biruni to Wali-Ullah, with special attention to the role of Sufism. An introduction to selected Muslim scholars and saints who contributed to the interaction between Islam and Hinduism in Northern India during the second millenium A.D. C-L: Comparative Area Studies. One course. *Lawrence*

218. Religion in Japan. A survey of religion in Japan, with specific emphasis on indigenization and attempts at synthesis. An approach to the meaning of the words *religious* and *secular* in the Japanese situation. C-L: Comparative Area Studies. One course. *Corless*

220. Rabbinic Hebrew. Interpretive study of late Hebrew, with readings from the Mishnah and Jewish liturgy. C-L: Judaic Studies. One course. *E. Meyers or staff*

221. Readings in Hebrew Biblical Commentaries. Selected Hebrew texts in Midrash Aggadah and other Hebrew commentaries reflecting major trends of classical Jewish exegesis. C-L: Judaic Studies. One course. *Bland*

226B. Exegesis of the Greek New Testament (Romans). Prerequisite: consent of instructor. One course. *Staff*

226F. Exegesis of the Greek New Testament (I and II Corinthians). Prerequisite: consent of instructor. One course. *Staff*

228. Twentieth-Century Continental Theology. An investigation of leading theologians and theological trends. One course. *Osborn*

231S. Seminar in Religion and Contemporary Thought. Analytical reading and discussion of such critical cultural analysis as is found in the works of Polanyi, Arendt, Trilling, and others, with appraisal of the relevance of theological inquiry. One course. *Staff*

232S. Religion and Literature. Theories concerning the relation of religion to literary forms, particularly narrative. One course. *Kort*

233. Modern Narratives and Religious Meanings. A study of kinds of religious meaning or significance in representative American, British, and continental fiction of the first half of the twentieth century. One course. *Kort*

234. Early Christian Asceticism. The development of asceticism and monasticism in the first six centuries of Christianity. C-L: Women's Studies. One course. *Clark*

235. Heresy: Theological and Social Dimensions of Early Christian Dissent. One course. *Clark*

238. Jewish Responses to Christianity. Apologetic and polemical themes in rabbinic, medieval, and contemporary writings. C-L: Judaic Studies. One course. *Bland*

239. Introduction to Middle Egyptian I. Grammar and readings in hieroglyphic texts relating to the Old Testament. One course. *Wintermute*

240. Introduction to Middle Egyptian II. Readings in Middle Egyptian and introduction to New Egyptian Grammar. Prerequisite: Religion 239. One course. *Wintermute*

243. Archaeology of Palestine in Biblical Times. Investigation of selected material remains from the Bronze Age to the Persian period. Trends in biblical studies, with particular attention to methodological considerations and current developments. One course. *C. Meyers*

244. The Archaeology of Palestine in Hellenistic-Roman Times. The study of material and epigraphic remains as they relate to Judaism in Hellenistic-Roman times, with special emphasis on Jewish Art. C-L: Judaic Studies. One course. *E. Meyers*

248. Theology of Karl Barth. A historical and critical study of Barth's theology. One course. *Osborn*

258. Coptic. Introduction to the Sahidic dialect with selected readings from Christian and Gnostic texts. Prerequisite: one year of Greek or consent of instructor. One course. *Wintermute*

264. The Sociology of the Black Church. An effort to identify, define, describe, and interpret the black church. One course. *Lincoln*

265. Religions of the West Africa Diaspora. Religious development of Africans displaced to the Western Hemisphere by slavery. C-L: Afro-American Studies 265 and Comparative Area Studies. One course. *Lincoln*

269S. Feminist Theory and the Humanities. See C-L: Interdisciplinary Course 283S; also C-L: English 283S and Women's Studies. One course. *Clark, Orr, Pope, or Tompkins*

280. The History of the History of Religions. The origin and history of the comparative study of religion, with particular attention to its methodology. One course. *Partin*

282. Myth and Ritual. Myths, rites, and symbols as modes of religious expression. Interpretation of symbolic configurations of kingship, initiation, sacrifice, and pilgrimage in diverse cultural contexts. C-L: Comparative Area Studies. One course. *Robinson and staff*

283. Islam and Modernism. Cultural, religious, and ideological forces which shape Muslim responses to modernism. C-L: Comparative Area Studies. One course. *Lawrence*

284. The Religion and History of Islam. Origins and development of the Islamic community and tradition, with particular attention to the religious element. C-L: Comparative Area Studies. One course. *Partin*

285. Introduction to the History of Religions. The history, symbols, rites, and structures of the manifestations of the sacred in the major religious traditions of the world. One course. *Staff*

287. The Scriptures of Asia. Translations of basic texts from the religious traditions of India, China, and Japan. C-L: Comparative Area Studies. One course. *Staff*

288. Buddhist Thought and Practice. A historical introduction to Buddhist thought and practice, with special attention to their interrelationship in the living religion. C-L: Comparative Area Studies. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

54. Protestant Traditions

71B, 72B. Freshman-Sophomore Seminars: Jewish and Christian Traditions

99. Perspectives in Archaeology

100. Selected Studies in the Bible: Pentateuch

107. Theology of the New Testament

108. The Life and Letters of Paul

111. The Historical Jesus

120. History of the Christian Church

124. Christianity in the United States

135. Jewish Religious Thought

147. Muhammad and the Qur'ān

166. The Professions and Society

230S. The Meaning of Religious Language

281. Phenomenology and Religion

RELIGION COURSES BY FIELDS

Introductory Courses. Religion 50, 51, 52, 52D, 53, 54, 55, 56, 57, 58, 59, 60.

African and Asian Religions. Religion 57, 71A, 72A, 140, 141, 145, 147, 149, 152, 160, 161, 162, 163, 195A, 196A, 217, 255, 265, 283, 284, 285, 287.

Jewish and Christian Traditions. Religion 50, 51, 52, 52D, 55, 71B, 72B, 100, 101, 102, 105, 106, 107, 108, 109, 110, 111, 115-116, 123, 124, 125, 127, 128, 129, 131D, 132D, 134, 135, 139, 195B, 196B, 207, 208, 220, 221, 226B, 228, 239, 243, 248, 258.

Analytic, Comparative, and Constructive Studies. Religion 56, 58, 59, 60, 71C, 72C, 99, 138, 142, 143, 144, 148, 151, 155, 156, 158, 166, 170, 172, 174, 188, 195C, 196C, 212, 233, 238, 264, 280.

THE MAJOR

Major Requirements. Eight courses, which must include at least two introductory courses (numbered 50 through 60). The distribution of courses must also include at least one each from the categories African and Asian traditions; Jewish and Christian traditions; and analytic, comparative, and constructive studies. One of the eight courses must be a junior-senior seminar or a 200-level course.

The student, in consultation with an assigned adviser and with the adviser's approval, should elect four of the eight courses in such a way that they constitute a thematic or methodological concentration on a particular aspect of religion.

To prepare for graduate or professional study of religion, the department recommends that students complete at least four courses in college level study, or the equiva-

lent, of a foreign language. Master of Arts and Doctor of Philosophy programs often require examination in one or two foreign languages. Students planning to attend a theological seminary should note that knowledge of biblical languages, as well as Latin, frequently is presupposed or required. Those planning to pursue studies of Asian religions should begin appropriate language study as part of their undergraduate preparation.

Honors. The department offers work leading to graduation with distinction. For further information consult the Director of Undergraduate Studies and the section on honors in this bulletin.

Romance Languages (RL)

Professor Fein, *Chairman*; Associate Professor Hull, *Director of Undergraduate Studies*; Professors Garci-Gómez, Jameson, Mudimbe, Osuna, Stewart, Tetel, and Wardropper; Associate Professors Bryan, Caserta, Kaplan, Orr, Pérez Firmat, Ripley, and Thomas; Assistant Professors Bell, Finucci, Ross, Sieburth, and Solterer; Professors Emeriti Cordle, N. Dow, Fowlie, and Jordan; Associate Professor Emeritus Vincent; Assistant Professors Emeriti M. T. Dow and Miller; Visiting Professor Dorfman; Visiting Assistant Professor Mudimbe-Boyi; Lecturer and Coordinator of Language Instruction Tufts

Majors in French and Spanish are available in this department.

French and Spanish 76, or an Achievement or Placement test score of 600 in French and 630 in Spanish, are the prerequisites for all courses over 100 not taught in English. Students who by reason of foreign residence have had special opportunities in French or Spanish must be classified by the Director of Undergraduate Studies.

The intensive language courses 181 and 182 provide an introduction to the language. They are recommended for students who wish to acquire proficiency in a second foreign language before entering graduate school.

In literature, one credit is granted for a score of 3 or 4 and two credits for a score of 5 (French or Spanish 70, 71) on the examination of the advanced placement program. In language, one advanced placement credit (French or Spanish 76) is granted for scores of 4 and 5.

FRENCH (FR)

1-2. Elementary French. Understanding, speaking, reading, and writing French. Language laboratory for recording-listening practice. Two courses. *Staff*

12. Review of Elementary French. Intensive review of first-year French. Open only to students with a placement or achievement score of 380-440. May not be taken for credit by students who have taken 1-2. One course. *Staff*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

63. Intermediate French. Grammar review, reading, and oral practice, including laboratory experience. Prerequisite: French 2, 12, or Achievement or Placement Test score of 450-540. One course. *Staff*

70, 71. These numbers represent one or two course credits for advanced placement in literature. One course each.

76. Advanced Intermediate French. Oral practice, reading, composition. Prerequisite: French 63 or Achievement or Placement Test score of 550-590. One course. *Staff*

101, 102. Introduction to French Literature. An introduction to the major writers of the French literary tradition. Selections and complete works of poetry, fiction, theater, and essay. 101: Middle Ages through the eighteenth century. 102: nineteenth and twentieth centuries. Lectures and discussions; short essays and tests. Conducted in French. One course each. *Staff*

103S, 104S. Discussions of Readings. Selected topics. Open only to freshmen and sophomores. One course each. *Staff*

107S. Contemporary Ideas. Readings and discussion of French works which have provoked political or intellectual thought in recent years. For freshmen and sophomores only. C-L: Comparative Area Studies. One course. *Staff*

108S. French Women: Myths, Realities, and the Law. Influential women writers of the last forty years: Beauvoir, Duras, Yourcenar, Sullerot, Veil, Halimi, and others. C-L: Women's Studies. One course. *Bryan*

110. Advanced Grammar and Composition. A systematic study of the structure of formal French. Practice in writing. One course. *Bryan or Hull*

111S. French for Current Affairs. Problems and controversies in today's France. Readings, discussions, and exposés. One course. *Bryan and staff*

112S. Special Topics in Advanced Language. Intensive work on the vocabulary and usage of a specialized field. Readings, discussions, and exposés. One course. *Staff*

113S. French for Business and Law. An introduction to French commercial and legal practices and vocabulary. One course. *Bryan*

114. Language and Civilization of Quebec. Offered only as part of summer program in Montreal. C-L: Canadian Studies and Comparative Area Studies. One course. *Staff*

117. French Phonetics. Sounds, rhythm, intonation. Individual practice in language laboratory. Readings in phonetic theory. One course. *Hull*

118. Advanced Translation and Stylistics. Differences between French and English patterns of expression. Levels of usage. Practice in translation. Prerequisite: French 110 or equivalent or consent of instructor. One course. *Hull or Thomas*

120. Language, Computers, and Formal Intelligence. Basic principles of functioning of any type of language considered as a symbolic coding. Symbolic structures and operations common to natural and programming languages, focusing on English, Algol 68, BASIC, and Pascal. Prerequisite: Anthropology 107 or English 111 or Computer Science 51. One course. *Thomas*

131S. French in the New World. French and Creole in Canada, New England, Louisiana, and the Caribbean. Origins, history, linguistic characteristics, current political and social issues. C-L: Canadian Studies, Comparative Area Studies, and Linguistics. One course. *Hull*

136S. Life in Eighteenth-Century France. A course based on period documents—books, memoirs, newspapers, scandal sheets—designed to give a picture of life in a large French city before the modern era. C-L: Comparative Area Studies. One course. *Stewart*

137. Aspects of Contemporary French Culture. Offered only as part of summer program in Paris. One course. *Staff*

139. French Civilization. The institutions and culture of France from the Middle Ages to the present. Readings and discussions in French. C-L: Comparative Area Studies. One course. *Tetel*

141S, 142S. French Literature. Topics to be announced. Open to juniors and seniors. One course each. *Staff*

143. Aspects of French Literature. Concentration on single authors, genres, movements, or themes. Topics to be announced. Offered only as part of summer program in Paris. One course. *Staff*

- 145S. Topics in Renaissance Literature and Culture.** Topics may include: women writers, love and self-knowledge, carnival and the grotesque, in search of Rome, text as political and religious pamphlet. C-L: Medieval and Renaissance Studies. One course. *Tetel*
- 146S. Montaigne and Self-Portraiture.** A reading of some *essais* in the light of the self-portrait in Renaissance art. C-L: Medieval and Renaissance Studies. One course. *Tetel*
- 147. The Roots of Modernity in Seventeenth-Century Literature.** Analysis of form and thought in selected works of Descartes, La Fontaine, Madame de Lafayette, Pascal, La Rochefoucauld, and La Bruyère. Emphasis on the innovations and lasting influence of each author. One course. *Staff*
- 148. French Drama of the Seventeenth Century.** The plays of Corneille, Racine, and Molière read in conjunction with several twentieth-century works to explore dramatic conventions and the difference between tragedy and comedy. C-L: Drama 126 and Medieval and Renaissance Studies. One course. *Staff*
- 151. French Comedy.** The theatrical tradition of comedy and its evolution, with emphasis on Molière, Marivaux, and Beaumarchais, and other readings from *Pathelin* to Ionesco. C-L: Drama 122. One course. *Stewart*
- 152. The Early French Novel.** Origins and evolution of the novel in the seventeenth and eighteenth centuries: Madame de Lafayette, Marivaux, Prévost, Rousseau, Diderot, Laclos, Sade. One course. *Stewart*
- 153. The French Enlightenment.** Religion, politics, and philosophic and literary ideas of eighteenth-century France: Montesquieu, Voltaire, Rousseau, and others. One course. *Stewart*
- 155. Romanticism in French Literature.** Romantic theory and practice; including Constant, Chateaubriand, Lamartine, Hugo, Musset, Vigny, and Nerval. One course. *Orr*
- 156. The Age of the Novel.** Flaubert, Balzac, and Stendhal. One course. *Bell or Orr*
- 158. Toward Modernism in French Poetry.** An introduction to modern trends in the nineteenth century; emergence from traditional romanticism; art for art's sake and Parnassians (Gautier, Leconte de Lisle); the transition from decadence to symbolism (Baudelaire, Verlaine, Rimbaud, and Mallarmé). One course. *Thomas*
- 159. Feminist Fiction.** Works by women in the modern period, including George Sand, Colette, Simone de Beauvoir, and others. C-L: Women's Studies. One course. *Orr*
- 162. French Drama of the Twentieth Century.** A survey of literature for the stage from 1890 to the present. One play each of Claudel, Maeterlinck, Jarry, Giraudoux, Cocteau, Ghelderode, Anouilh, Montherlant, Sartre, Camus, Genet, Ionesco, Beckett, Pinget, Vian, and Arrabal. C-L: Drama 123. One course. *Staff*
- 163. French Poetry of the Twentieth Century.** The symbolist heritage and surrealism: Mallarmé, Apollinaire, Breton, Eluard, Tzara, and others. One course. *Thomas*
- 166, 167. Contemporary French Life and Thought.** Major writers of the twentieth century and their historical and cultural circumstances. 166: Proust, Gide and the *Nouvelle revue française*, Colette, Alain-Fournier, Mauriac and the generation of 1914; the social novel of the 1930s. 167: Existentialism and *Les Temps Modernes*; the New Novel, the writer-critics, recent trends. C-L: Comparative Area Studies. One course each. *Kaplan*
- 169. The Contemporary Novel in French Canada.** Major trends in the novel since World War II: social revolt, proletarianism, political and religious liberation, and rejection of the past. C-L: Canadian Studies and Comparative Area Studies. One course. *Staff*

181. Intensive French. An introduction to the language. Prerequisite: four semesters of another foreign language or consent of instructor. One course. *Staff*

182. Intensive French. Readings in modern literature: analysis and discussion. Prerequisite: French 181 or consent of instructor. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

200S. Seminar in French Literature. Topics to be announced. One course. *Staff*

210. The Structure of French. Modern French phonology, morphology, and syntax. Readings in current linguistic theory. C-L: Linguistics. One course. *Hull*

211. History of the French Language. The evolution of French from Latin to its present form; internal developments and external influences. C-L: Linguistics and Medieval and Renaissance Studies. One course. *Hull*

223. Semiotics for Literature. Theoretical writings in general semiotics by Frege, Peirce, Saussure, Mukarovsky, and Morris and their applications for textual analysis of French literary works by representative contemporary critics such as Eco, Riffaterre, Corti, and Greimas. Taught in English. One course. *Thomas*

248. French Literature of the Seventeenth Century. The baroque and the classical: form and meaning in the plays of Corneille, Racine, and Molière. Readings in baroque and précieux poetry. C-L: Medieval and Renaissance Studies. One course. *Staff*

251, 252. Literature of the Eighteenth Century. Problems of literary history, critical reading, and interpretation, focused on varying topics. One course each. *Stewart*

255. French Preromantic and Romantic Poetry. Chénier, Vigny, Lamartine, Hugo, and Nerval. One course. *Orr*

256. Modern Literature and History. The problems of history, society, and politics in literature, through the writings of Rousseau, Tocqueville, Michelet, Flaubert, Hugo, Merleau-Ponty, Foucault, and others. C-L: Comparative Area Studies. One course. *Orr*

257. Problems of Identity in the Nineteenth-Century Novel. Romanticism and romantic realism, studied especially in the works of Chateaubriand, Stendhal, Constant, de Staël, and Sand. One course. *Bell, Jameson, or Orr*

258. The Narrative of Social Crisis. Realism and naturalism, with special emphasis on Balzac, Flaubert, and Zola. One course. *Bell, Jameson, or Orr*

261. French Symbolism. Poetry and theories of Baudelaire, Mallarmé, and Rimbaud. Decadence: Lautréamont and Laforgue. One course. *Thomas*

263. Contemporary French Theater. Dramatic theory; the art of the leading directors; and the major texts of Claudel, Anouilh, Sartre, Beckett, Ionesco, Genet, Adamov, Arrabal, and Rezvani. One course. *Orr or Thomas*

264. Contemporary French Poetry. The language of poetry. A chronological and theoretical approach to the major poets and movements since 1950. Selections from Bonnefoy, Char, Daive, Deguy, Dupin, Jabès, Jaccottet, Faye, Guillevic, Michaux, Meschonnic, Noël, Oulipo, Ponge, Stafan, Tortel, and others. One course. *Orr or Thomas*

265. French Literature of the Early Twentieth Century. Emphasis on Gide, Mauriac, Proust, and Colette. One course. *Kaplan*

266. French Literature of the Mid-Twentieth Century. Emphasis on Malraux, Sartre, Camus, and the *nouveau roman*. One course. *Jameson*

267. Contemporary French Novel. A chronological and theoretical approach to the major writers and movements since 1970. Selections from Duras, LeClézio, Sallenave, Modiano, Sollers, Tournier, Oulipo, Yourcenar, and others. One course. *Kaplan, Orr, or Thomas*

290S. Studies in a Contemporary Figure. A writer, philosopher, critic, or artist. One course. *Staff*

Courses Currently Unscheduled

122. The French Film

132. Literature and History of Quebec

170. Film and the French Novel

ITALIAN (IT)

1-2. Elementary Italian. Understanding, speaking, reading, and writing Italian. Language laboratory available for recording-listening practice. Two courses. *Staff*

63. Intermediate Italian. Grammar review, reading, oral practice including laboratory experience. One course. *Staff*

76. Advanced Intermediate Italian. Oral practice, reading, and composition. Prerequisite: Italian 63 or Achievement or Placement Test score of 550-590. One course. *Finucci or staff*

101. Writers of the Middle Ages and Quattrocento. Readings from Dante, Petrarch, Boccaccio, and the Humanists. C-L: Medieval and Renaissance Studies. One course. *Caserta or Finucci*

102. Writers from the Renaissance to Preromanticism. Readings from Machiavelli, Ariosto, Tasso, Marino, Goldoni, Parini, Alfieri, and others. C-L: Medieval and Renaissance Studies. One course. *Caserta or Finucci*

103. Italian Poetry and Prose of the Nineteenth Century. Works by Foscolo, Manzoni, Leopardi, Verga, and others. One course. *Caserta or Finucci*

105. Italian Women Writers. Representative works by women from the Middle Ages to the modern period. Caterina da Siena, Colonna, Stampa, Aleramo, Deledda, Morante, and others. C-L: Women's Studies. One course. *Finucci*

111. Advanced Spoken Italian. Intensive instruction in Italian using selected topics, readings, and films to build vocabulary and to provide practice in oral communication. Prerequisite: successful completion of Italian 63, 76, or 182 or achievement or placement test score of 600. One course. *Caserta or Finucci*

181. Intensive Italian. An introduction to the language. Prerequisite: four semesters of another foreign language or consent of instructor. One course. *Caserta*

182. Intensive Italian. Readings in modern literature: analysis and discussion. Prerequisite: Italian 181 or consent of instructor. One course. *Caserta*

191, 192. Independent Study. Directed reading and research. Open only to qualified juniors by consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research. Open only to qualified seniors by consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

283. Italian Novel of the Novecento. Representative novelists from Svevo to the most recent writers. One course. *Caserta*

284, 285. Dante. 284: *La Vita Nuova* and a close reading of the *Inferno*. 285: The *Purgatorio* and the *Paradiso* in the light of Dante's cultural world. Special attention will be given to the poetic significance of the *Commedia*. Reading in Italian or English. Prerequisite: for 285, Italian 284 or equivalent. C-L: Medieval and Renaissance Studies. One course each. *Caserta*

Courses Currently Unscheduled

137. The Italian Cinema

PORTUGUESE (PTG)

181. Brazilian Portuguese. An intensive introduction to the language. Prerequisite: four semesters of another foreign language or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

182. Topics in Portuguese and Brazilian Literature and Culture. Grammar review, readings, and discussion. Focus on twentieth-century Luso-African, Portuguese, and Brazilian writers. Prerequisite: Portuguese 181 or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

191, 192, 193, 194. Independent Study. One course each. *Staff*

SPANISH (SP)

1-2. Elementary Spanish. Understanding, speaking, reading, and writing Spanish. Language laboratory available for recording-listening practice. Two courses. *Staff*

12. Review of Elementary Spanish. Intensive review of first-year Spanish. Open only to students with a placement or achievement score of 430-490. May not be taken for credit by students who have taken 1-2. One course. *Staff*

14. Intensive Elementary Spanish. Offered only in the Duke-in-Spain program. Two courses. *Staff*

63. Intermediate Spanish. Grammar review, reading, and oral practice, including laboratory experience. Prerequisite: Spanish 2, 12, or Achievement or Placement Test score of 500-570. One course. *Staff*

70, 71. These numbers represent one or two course credits for advanced placement in literature. One course each.

76. Advanced Intermediate Spanish. Oral practice, reading, composition. Prerequisite: Spanish 63 or Achievement or Placement Test score of 580-620. One course. *Staff*

100S. Introduction to Literary Analysis. How to approach different genres in literature. Narrative, poetry, drama, and essay. Texts drawn from different periods of Spanish or Spanish-American literature. One course. *Ross*

101, 102. Introduction to Literature. Major writers of the Spanish literary tradition. Poetry, fiction, theater, and essay. 101: Middle Ages through the seventeenth century. 102: eighteenth, nineteenth, and twentieth centuries. One course each. *Garcí-Gómez, Osuna, and staff*

103S, 104S. Discussion of Readings. Selected topics. Open only to freshmen and sophomores. One course each. *Staff*

105, 106. Introduction to Spanish-American Literature. A survey of major writers and movements from the period of discovery to the present day. 105: the periods of conquest, colonial rule, and early independence. Includes works by native Indian, *mestizo*,

and women writers. 106: from *Modernismo* to the contemporary period. C-L: Comparative Area Studies. One course each. *Fein or Ross*

107S. Spanish-American Short Fiction. Novelettes and short stories of the twentieth century: Borges, Cortázar, Denevi, Donoso, García Márquez, and others. C-L: Comparative Area Studies. One course. *Fein*

108S. Spanish Traditional Poetry. The Spanish *Romancero*; ballads and other forms of popular poetry. C-L: Comparative Area Studies and Medieval and Renaissance Studies. One course. *Garci-Gómez*

109S. Contemporary Hispanic Ideas. Readings in twentieth-century Spanish and Spanish-American nonfiction. Open only to freshmen and sophomores. One course. *Pérez Firmat*

110. Spoken Spanish. Study of colloquial Spanish, practice in pronunciation and conversation, emphasis on oral communication. Prerequisite: Spanish 76 or consent of instructor. One course. *Garci-Gómez and staff*

111. Written Spanish. Grammatical problems in composition and translations; introduction to the techniques of literary and professional styles. One course. *Pérez Firmat and staff*

114S. Spanish Language: Peninsular or American. Topics to be announced. One course. *Staff*

118S. Translation from and into Spanish. Practice in translation, study of professional and model translations, with emphasis on improving skills in the use of both Spanish and English by means of close comparisons of the two languages. One course. *Wardropper and staff*

119S. Structure of Spanish. A systematic study of modern Spanish morphology and syntax with some readings in current linguistic theory. Prerequisite: Spanish 110 or 111. C-L: Linguistics. One course. *Staff*

121. Latin-American Literature in Translation. Fictional and poetic works of the last thirty years that have made an impact on world literature. Taught in English. C-L: Comparative Area Studies and Comparative Literature 129. One course. *Dorfman or Fein*

131. Topics of Hispanic Civilization. A humanistic study of Spain or Spanish America through history, culture, people, and institutions. C-L: Comparative Area Studies. One course. *Staff*

137. Aspects of Contemporary Spanish Culture. Offered only as part of the summer program in Spain. One course. *Garci-Gómez*

141S, 142S. Spanish Literature. Topics to be announced. Open to juniors and seniors. One course each. *Staff*

143S. Literature of the Discovery and Conquest of America. Prose and poetry from the sixteenth through eighteenth centuries, exploring the idea of the New World from conquest to independence. One course. *Ross*

144S. Spanish-American Literature of Identity. Exploration of the concepts of *lo criollo* or *lo americano*, essentially through the analysis of texts by Arriví, Carpentier, Neruda, Paz, and others. One course. *Pérez Firmat*

145S. Literature of the Hispanic Minorities of the United States. Representative Spanish-language works by Puerto Rican, Cuban-American and Chicano writers. One course. *Pérez Firmat*

146. The Spanish-American Novel. Masterworks of the twentieth century. C-L: Comparative Area Studies. One course. *Fein*

- 151. Spanish Literature of the Renaissance and the Baroque.** Selected works of the sixteenth and seventeenth centuries with attention to their reflection of social, religious, and political ideas. C-L: Medieval and Renaissance Studies. One course. *Ross or Wardropper*
- 153. Golden Age Literature: Cervantes.** Emphasis on the *Quijote*. C-L: Medieval and Renaissance Studies. One course. *Staff*
- 163. The Generation of 1898.** Selected works by Unamuno, Baroja, Azorín, Valle-Inclán, and Machado. One course. *Osuna*
- 165S. Major Spanish Authors.** Textual studies; methods of literary interpretation and criticism. One course. *Wardropper*
- 166. Nineteenth-Century Prose Fiction.** Major forms in Spain and Spanish America: Clarín, Blest-Gana, Cambaceres, Galdós, and others. C-L: Comparative Area Studies. One course. *Pérez Firmat or Sieburth*
- 169. Topics in Nineteenth- and Twentieth-Century Spanish Literature.** Focus on a specific genre or theme to be announced. One course. *Sieburth*
- 171. Literature of Contemporary Spain.** A sociological approach to the novel, theater, and poetry: Goytisolo, Buero Vallejo, Sastre, Arrabal, Celaya, and Otero. C-L: Comparative Area Studies. One course. *Osuna*
- 181. Intensive Spanish.** An introduction to the language. Modern readings. Prerequisite: four semesters of another foreign language or consent of instructor. One course. *Staff*
- 182. Readings in Spanish-American Literature.** Prerequisite: Spanish 181 or consent of instructor. One course. *Staff*
- 191, 192. Independent Study.** Directed reading and research. Open only to qualified juniors by consent of instructor and Director of Undergraduate Studies. One course each. *Staff*
- 193, 194. Independent Study.** Directed reading and research. Open only to qualified seniors by consent of instructor and Director of Undergraduate Studies. One course each. *Staff*
- 200S. Seminar in Spanish Literature.** Topics to be announced. One course. *Staff*
- 210. History of the Spanish Language.** Formation and development. Internal forces and external contributions. C-L: Comparative Area Studies, Linguistics, and Medieval and Renaissance Studies. One course. *Garci-Gómez*
- 241. Colonial Prose of Spanish America.** Narrative forms written in Spanish America during the sixteenth, seventeenth, and eighteenth centuries. One course. *Ross*
- 245. Modern Spanish-American Poetry.** From modernismo to the present. C-L: Comparative Area Studies. One course. *Fein*
- 246. Modern Spanish-American Fiction.** Twentieth-century novels and short stories by Borges, Carpentier, Cortázar, Gallegos, García Márquez, Quiroga, and others. C-L: Comparative Area Studies. One course. *Pérez Firmat*
- 248. Studies in Spanish-American Literature.** Concentration on single authors, genres, movements, or themes. One course. *Staff*
- 251. The Origins of Spanish Prose Fiction.** Selected examples of the romance and the novel: *Amadís de Gaula*, Diego de San Pedro's *La Cárcel de amor*, the Abencerraje, the *Lazarillo*, Montemayor's *Diana*. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

253. Cervantes. The life and thought of Cervantes with special emphasis on his *Quijote*. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

254. Drama of the Golden Age. The chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

258S. Spanish Lyric Poetry before 1700. Selected poems of the Middle Ages, Renaissance, and baroque. Special emphasis on the *Razón de amor*, *la poesía de tipo tradicional*, and Santillana; on Garcilaso, San Juan de la Cruz, Fray Luis de León, and Herrera; on Góngora and Quevedo. C-L: Medieval and Renaissance Studies. One course. *Wardropper*

262. The Romantic Movement. Principal manifestations of romanticism in Hispanic literature; poetry (Becquer, Espronceda, Rosalia de Castro), drama (Rivas, Zorilla), and the novel (Isaacs, Marmol). One course. *Pérez Firmat*

275. Modern Spanish Poetry. Juan Ramón Jiménez, Unamuno, Antonio Machado, the Generation of 1927, and the contemporary poets. One course. *Osuna*

276. Modern Spanish Drama. The theater of Benavente, Valle-Inclán, Lorca, Casona, Buero Vallejo, Sastre, and Arrabal. One course. *Osuna*

277. Modern Spanish Novel. From the Generation of 1898 to the present. One course. *Osuna*

Courses Currently Unscheduled

117S. Advanced Grammar

133S. Spanish-American Civilization

242. Colonial Poetry and Theater of Spanish America

ROMANCE LANGUAGES (RL)

218. The Teaching of Romance Languages. Evaluation of objectives and methods; practical problems of language teaching at the elementary, secondary, and college levels; analysis of textbooks, tests, and audiovisual aids. Taught in English. One course. *Tufts*

THE MAJOR IN FRENCH OR SPANISH

Prerequisite. French or Spanish 74 or 76 or equivalents.

Major Requirements. *French:* A total of eight courses numbered 100 or above. These must include 101, 102, and at least three courses above 140. *Spanish:* A total of eight courses numbered 100 or above. These must include two of the following: 101, 102, 105, 106; and at least three courses above 140. Courses numbered 120 through 129 (French and Spanish) are taught in English and do not count toward the major.

Study Abroad. Students are strongly urged to study abroad, since this is the best way to achieve language proficiency and to acquire an intimate knowledge of a country's culture. A maximum of two courses per semester, or one per summer, may be counted toward the major. (The summer course restriction does not apply to Duke-sponsored programs.)

Suggested Work in Related Disciplines. In order to give perspective to a student's program, majors in French or Spanish will normally select, with the approval of the major adviser, appropriate courses from such fields as: (1) other languages and literatures; (2) history; (3) philosophy; (4) music and art; and (5) linguistics.

OPTION FRANÇAIS

Option Français is an offering of courses taught in French. Unlike the French courses offered by the Department of Romance Languages, however, in which language or liter-

ature is the essential subject matter, these are courses in various departments where French is simply the medium of instruction. Prerequisite: French SAT score of 600 (or the same score on the Placement Test), a score of 3 on the Advanced Placement Test in French, or prior completion of a French course numbered above 70.

Art 136: Gothic Cathedrals. *Bruzelius*

History 23: Europe to the Eighteenth Century. *Witt*

Music 119: The Humanities and Music. *Bartlet, Higgins, or Seebass*

Music 125: Masterworks of Music. *Seebass*

Sociology 24S: Paris and Montreal in 1900 and 1968. *Tiryakian*

These courses appear also in the listings of the several departments. They meet distributional and Field of Knowledge requirements as these are specified elsewhere in the undergraduate *Bulletin*. They do *not* meet requirements for the major in French.

Russian

For courses in Russian, see Slavic Languages and Literatures.

Science, Technology, and Human Values Program

Professor Vesilind, *Director*

A certificate, but not a major, is available in this program.

The program in Science, Technology, and Human Values offers students the opportunity to develop a comprehensive view of science, medicine, or technology in social, historical, and ethical terms. Although a major is not available in this program, the course of study will enrich the understanding of one's profession for the future scientist, physician, or engineer and will broaden the appreciation of activities in these areas for others.

COURSE OF STUDY

Duke courses pertinent to the program are classified according to their approach: ethical, analytical (historical, philosophical, or sociological), or policy-centered. Each student entering the program designates, for purposes of advising, an area of primary interest and then selects a program of five courses (four for engineering majors) covering all three approaches. Individual programs, selected from more than fifty courses, are tailored to each student's interests.

Students in the program focus their course work and individual interests through a year-long interdisciplinary seminar offered in the senior year (Interdisciplinary Course 107S, 108S). A seminar consisting of six varied topics in science and the humanities is offered as a course for undergraduates (Interdisciplinary Course 112S, 113S).

Full details concerning the program and courses in Science, Technology, and Human Values may be obtained by writing or calling the Director.

ELIGIBILITY AND CERTIFICATION

Students normally apply to the program at any time before the end of their junior year. On the basis of the expressed area of primary interest, each student is assigned a faculty adviser from the program steering committee, with whom he or she designs a program to suit his or her particular interests. To students who complete the program, Duke University gives official recognition of their participation.

Slavic Languages and Literatures

Assistant Professor Pugh, *Acting Chairman and Director of Undergraduate Studies*; Assistant Professor Andrews, *Supervisor of Language Instruction*; Professor Emeritus Krynski; Associate Professor Emeritus Jezierski; Instructor Flath

A major is available in this department.

RUSSIAN (RUS)

1-2. Elementary Russian. Introduction to understanding, speaking, reading, and writing. Audiolingual techniques are combined with required recording-listening practice in the language laboratory. Two courses. *Staff*

3. Introduction to Russian Conversation. Beginning conversation class: emphasis on everyday use of constructions that present particular difficulties for learners of Russian. Taught in Russian in the U.S.S.R. Prerequisites: Russian 1 and 2, or equivalent. One course. *Staff*

14. Intensive Russian. Russian 1 and 2 combined in one course. Two meetings daily, as well as daily computer and language laboratory work. One course. *Staff*

63, 64. Intermediate Russian. Intensive classroom and laboratory practice in spoken and written patterns. Reading in contemporary literature. Prerequisites: Russian 1 and 2, or two years of high school Russian. One course each. *Staff*

65. Intermediate Conversation and Composition. Consolidation of grammatical skills. Intensive conversation on current topics of interest to students of the U.S.S.R. Development of writing skills. Taught in Russian in the U.S.S.R. Prerequisites: Russian 63 and 64, or equivalent. One course. *Staff*

91S, 92S. Advanced Russian Conversation and Readings. Nineteenth- and twentieth-century literature in the original. Conducted in Russian. Prerequisites: for 91S, Russian 63 and 64, or equivalent; for 92S, Russian 91S. One course each. *Staff*

93. Issues in Contemporary Standard Russian. The Russian language in Soviet society: different writing styles; dialects in comparison with standard Russian; sociological implications. Taught in Russian in the U.S.S.R. Prerequisites: Russian 91S and 92S, or equivalent. One course. *Staff*

100. Studies in Russian Culture. Introduction to the culture and political system of the USSR. (Taught in the USSR in Russian or English depending on placement.) C-L: Comparative Area Studies. One course. *Andrews*

106S. Russian and Polish Drama of the Nineteenth and Early Twentieth Centuries. Taught in English. C-L: Drama 127S. One course. *Staff*

124. Masters of Russian Short Fiction. Pushkin, Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, Babel, and others. Taught in English. C-L: Comparative Area Studies. One course. *Staff*

150. The Languages of the Soviet Union. Structural survey of the various language families represented in the U.S.S.R., with special emphasis on national language policy in that country, bilingualism, and language contact. Taught in English. One course. *Pugh*

161, 162. Introduction to the Russian Novel. Outstanding works. 161: Lermontov, Gogol, Turgenev, Goncharov, and Tolstoy. 162: Dostoevsky, Bely, Sologub, Bunin, and Gorky. Taught in English. C-L: Comparative Area Studies. One course each. *Staff*

175. Tolstoy. Introduction to life and works, including: *War and Peace*, *Anna Karenina*, the shorter fiction, dramatic works, and essays. Tolstoy's impact on the literature and thought of today, in and outside of Russia. Taught in English. C-L: Comparative Area Studies. One course. *Staff*

176. Dostoevsky. Introduction to life and works. Emphasis on his relevance to today's world. Readings include: *Crime and Punishment*, *The Idiot*, and *The Brothers Karamazov*. Historical overview of critical reaction in Russia and abroad. Taught in English. C-L: Comparative Area Studies. One course. *Staff*

180, 181. Twentieth-Century Russian Literature. A survey of Russian prose, poetry, and plays by representative authors from Blok to Nabokov. Attention to nonconformist and emigré writers. Taught in English. One course each. *Staff*

185S. Introduction to Slavic Linguistics. Basic introduction to linguistic terminology; emphasis on synchronic linguistic theory in the East, West, and South Slavic areas. Phonological, morphological, and syntactic structure of contemporary standard Russian. Readings in English and Russian. C-L: Comparative Area Studies and Linguistics. One course. *Andrews*

186S. History of the Russian Language. The development of the Russian language from the eleventh century, with consideration of the origins of modern literary and dialectal features. Readings in Russian. Prerequisite: second year Russian or consent of instructor. C-L: Comparative Area Studies and Linguistics. One course. *Pugh*

190. The Social History of Russian Literature 1689-1917. An inquiry into the social context of the Russian writer and the creative act. The history of books, publishing, and the changing role of writers in Imperial Russia. Taught in English. One course. *Pelech*

191, 192. Independent Study. Directed reading and research. Open only to qualified students by consent of Director of Undergraduate Studies. One course each. *Staff*

193, 194. Independent Study. Directed reading and research for qualified seniors. Prerequisite: consent of Director of Undergraduate Studies. One course each. *Staff*

195. Advanced Russian. Review of grammar with an emphasis on the refinement of oral and written language skills. Prerequisite: Russian 92 or consent of instructor. One course. *Staff*

196. Readings in Modern Russian. An intensive reading and conversation course based on contemporary Russian literary and Soviet press texts, emphasizing problems in Russian-English and English-Russian translation. Prerequisite: Russian 195 or consent of instructor. C-L: Comparative Area Studies. One course. *Staff*

197. Syntax. Application of advanced syntactic structures to speech situations and written Russian. Taught in Russian in the U.S.S.R. Prerequisites: Russian 195 and 196, or equivalent. One course. *Staff*

For Seniors and Graduates

225. Tolstoy. *War and Peace* and other works. Prerequisite: Russian 175 or equivalent. C-L: Comparative Area Studies. One course. *Staff*

232. Dostoevsky. Emphasis on *The Brothers Karamazov* and the theory of the novel. Prerequisite: Russian 176 or equivalent. C-L: Comparative Area Studies. One course. *Staff*

Courses Currently Unscheduled

91P, 92P. Preceptorial

172. Russian Prison Camp Literature

177. Introduction to the World of Chekhov

183. Slavic Drama and Theater of the Twentieth Century

187. Russian and Central European Writers on Communism

201, 202. Russian Novel of the Nineteenth Century

POLISH (POL)

Courses Currently Unscheduled

11. Beginning Polish

12. Intermediate Polish

174. The Poles: Literature and Society, 1940-1980

THE MAJOR

Prerequisites. Russian 1-2 and 63, 64 or equivalent.

Major Requirements. A minimum of eight courses in the department. All majors must take the following courses: Russian 91, 92, 195, 196, plus four courses in literature.

Students contemplating graduate work may elect a more intensive program consisting of ten courses. An in-depth knowledge of Russian literature or some knowledge of Polish language and/or literature will facilitate admission to graduate school and subsequent study in the field.

Sociology (SOC)

Professor Land, *Chairman*; Associate Professor Wilson, *Director of Undergraduate Studies*; Professors Back, George, Kerckhoff, Maddox, Myers, Palmore, Simpson, Smith, and Tiryakian; Associate Professors Gereffi, O'Rand, and Spenner; Assistant Professor Janoski; Adjunct Professor Manton

A major is available in this department.

Sociology combines an appreciation of human beings' capacity for self-realization with a scientific understanding of the causes and consequences of their social behavior. Each course aims to develop both the analytical and critical skills necessary for understanding and evaluating social institutions and social change. Emphasis is upon contemporary research and the use of sociological data in tackling social problems. Active involvement in the learning process is fostered through seminars, independent study, honors work, and internships.

10D. Introduction to Sociology. Structure and dynamics of groups, organizations, and institutions; social behavior over the life cycle; social control and deviance; population and social ecology; formation and change of societies. Two lectures and one discussion section. One course. *Janoski, Simpson, or Tiryakian*

11. Contemporary Social Problems. A survey of approaches to the study of current social problems and social trends. Sexism, racism, age discrimination; job displacement by technological change; social consequences of environmental pollution; unemployment and poverty; interpersonal problems associated with changes in family structures; maldistribution of health care and educational opportunities; deviance. One course. *Land*

Social Issues of Contemporary Society. Topics vary from semester to semester. One course each. *Staff*

20S. Individual and Society. One course.

21S. American Demographics. One course.

22S. The Third World. One course.

23S. Social Organization. One course.

24S. Social History. One course.

25S. Deviance. One course.

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

101. Contemporary American Society. Social trends and social problems and their effects on individuals and society. Urbanization; bureaucracy; distribution of wealth, income, and power; status of minorities. One course. *Kerckhoff*

102. America in the Modern World System. Sociological aspects of twentieth-century involvement of the United States in international economic, political, and social affairs, including the notion of American exceptionalism, the roots of American foreign policy, the role of the United States transnational corporations, the contemporary welfare state, the crisis of democracy debate, and the North-South dialogue. One course. *Gereffi*

106. Social Psychology. See C-L: Psychology 116; also C-L: Women's Studies. One course. *Costanzo or George*

110. Comparative Sociology. Comparative sociological studies focusing on diverse societies of the world. Topics include population and migration, social stratification, the organization of work, urban forms, law and social control, the family, development and global interdependence, culture and communication. C-L: Comparative Area Studies. One course. *Gereffi, Myers, Smith, or Tiryakian*

111. Inequality in America. Differences in social position in the United States as they relate to income, prestige, and power. Primary focus on the process of achievement, including level of education and occupational position, while controlling for race, sex, and age. C-L: Women's Studies. One course. *Kerckhoff or O'Rand*

112. American Demographics. Examination of trends in the fertility, migration, geographic distribution, and composition of the United States population. Consequences for lifestyles, social trends, consumer markets, health care, and public policy. One course. *Land or Myers*

116. Race and Ethnic Relations. History and changing nature of race and ethnic relations, with special reference to the United States. Sources, forms, and consequences of racial discrimination; movements for racial integration and separatism; the intersection of race, class, and gender. C-L: Afro-American Studies 116. One course. *Staff*

118. Sex, Gender, and Society. Nature and acquisition of sex roles. Cross-cultural variations. Developing nature of sex roles in American society. C-L: Comparative Area Studies and Women's Studies. One course. *O'Rand*

119. Juvenile Delinquency. Environments in which juvenile delinquency develops; delinquent subcultures and peer groups; societal reactions to delinquency in schools, courts, and other agencies. One course. *Land*

Sociology 120, 122, and 123 are designed as a sequence and might optimally be taken in that order, with Sociology 120 being recommended preparation for 122 and 123. However, there are no prerequisites.

120. Causes of Crime. Definition, types, and extent of crime; biological, psychological, economic, and social causes of criminality; explanation and critical evaluation of theories of crime; structure and patterns of recruitment of criminal organizations; social reactions to crime and the justice system. One course. *Land*

122. Punishment and Treatment of Deviants. Concepts of punishment and rehabilitation. Programs and facilities for deviants. Structure and operation of "total" institutions, such as prisons and hospitals. Problems of returning to family and community life. One course. *Simpson*

123. Social Aspects of Mental Illness. Theoretical and practical sociological contributions to problems of etiology, definition, law, and treatment; comparisons with other contributions; questions of public policy and programs. One course. *Back or Palmore*

124. Human Development. See C-L: Interdisciplinary Course 124; also C-L: Human Development and Psychology 124. One course. *Maddox and staff*

125. Strategies of Comparative Analysis. See C-L: Interdisciplinary Course 125; also C-L: Anthropology 125, Comparative Area Studies, History 137, and Political Science 125. One course. *Staff*

126. Third World Development. Theories concerning the role of transnational corporations and international financial institutions (e.g., World Bank) in the development of Third World nations, assessed with the aid of sociological and economic data. C-L: Comparative Area Studies. One course. *Gereffi*

132. Methods of Social Research. Principles of social research, design of sociological studies, sampling, and data collection with special attention to survey techniques. One course. *Myers*

133. Statistical Methods. Elementary statistical techniques and their application to the analysis and interpretation of social science data. Theory of inference is stressed. Not open to students who have had Mathematics 136, Statistics 10 or 200, or equivalent. C-L: Psychology 117. One course. *Staff*

135. Computers and Society. The impact of the computer and related technologies on society. Topics include the effects on individual freedom and the nature of work, the implications of high speed information retrieval, and others. One course. *Smith or Spenner*

138. History of Social Thought. Theories of society and social relations in the writings of Montesquieu, Rousseau, Comte, Marx, Weber, Durkheim, Simmel, Veblen, Sorokin, and others. The history of sociology in relation to philosophical currents, social movements, and transformation of the modern world. One course. *Tiryakian or Wilson*

139. Marxism and Society. A critical appraisal of Marxism as a scholarly methodology for understanding human societies. The basic concepts of historical materialism, as they have evolved and developed in historical contexts. Topics include sexual and social inequality, alienation, class formation, imperialism, and revolution. Core course for the program in Perspectives on Marxism and Society. C-L: Anthropology 139, Education 139, History 186, and Interdisciplinary Course 139. One course. *Fox or J. Wilson*

143. Industrial Relations. Theories and current research on the interlocking roles of business and labor in the United States and elsewhere. One course. *Gereffi or Janoski*

149. Sexuality and Society. Sociocultural factors affecting sexual behavior. Changing beliefs about sex; how sexual knowledge is socially learned and sexual identities formed; the relation between power and sex; control over sexual expression. One course. *Tiryakian*

150. The Changing American Family. Structure, organization, and social psychology of marital, parental, and sibling relations over the life cycle of a family; courtship, marriage, family dissolution in relation to contemporary American society; deviations from and alternatives to the traditional nuclear family. C-L: Women's Studies. One course. *Kerckhoff or Simpson*

151. Sociology of Religion. The religious factor in modern society and the social factor in modern religion. Major sociological theories and marginal religious groupings. One course. *Tiryakian or Wilson*

153. Sport and Society. The effect of sports on people, their self-image, and social roles. Relation of sports as an institution to the family, education, economics, and politics. One course. *Wilson*

154. Art and Literature in Society. An analysis of the social relations of the world of the arts (painting and sculpture, music, and literature) with emphasis upon creative artists, art publics, art organizations, and art works as they function in their social-cultural milieux. One course. *Back or Tiryakian*

- 155. Organizations and Management.** Forms of work organization (corporations, government agencies), the social forces shaping them (management styles, technology, government policy, labor markets), and their effects on employees (productivity, work satisfaction, turnover). C-L: Women's Studies. One course. *Simpson or Wilson*
- 156. Science, Technology, and Social Change.** The ways in which society influences the production of scientific knowledge and its transformation into usable technology. Effects of technological and scientific innovation on social life. One course. *O'Rand*
- 157. The Legal Profession and the Law.** Development of the American legal profession, emphasizing the recruitment and training of lawyers, the ways lawyers' work is organized, the role of professional associations, the determinants of success in legal practice, and the influence of legal ethics on practice. One course. *Simpson, Tiryakian, or Wilson*
- 158. Markets and Marketing.** Markets as systems of social exchange: how they are organized and develop; their relationship to other social structures such as families, work organizations and the state; their impact on individuals, careers, consumption patterns, and lifestyles. One course. *Simpson or Spenner*
- 159. The Sociology of Entrepreneurship.** The social origins and careers of entrepreneurs. The interrelation of their work and family roles and the distinctiveness of their values and interests. The role of entrepreneurial activity in societal development, and its function in different industries, ethnic groups, and societies. One course. *Simpson, Spenner, or Wilson*
- 160. Advertising and Society.** See C-L: Anthropology 110; also C-L: English 120 and Women's Studies. One course. *O'Barr, J. Smith, or Wilson*
- 161. Aging and Death.** Sociological and psychological perspectives on aging, from adolescence through old age and death; demography of human aging; problems caused by increased longevity; policy issues. C-L: Women's Studies. One course. *George or O'Rand*
- 162. Health and Illness in Society.** Relations between patients and health professionals, and utilization of resources for health care. One course. *Back*
- 165. Occupations, Professions, and Careers.** How occupations organize and control labor markets, define services, chart career lines, and develop and sustain occupational identities. C-L: Women's Studies. One course. *Simpson or Spenner*
- 167. The Social Bases of Politics.** Theories of and research on political power at the community, national, and international levels. C-L: Women's Studies. One course. *Gereffi or Smith*
- 169. Psychosocial Aspects of Human Development.** See C-L: Psychology 130; also C-L: Human Development and Interdisciplinary Course 180. One course. *Martin Lakin and Maddox*
- 170. Mass Communication.** An analysis of the role of radio, the press, magazines, movies, and television. An examination of the selective audiences, content characteristics, controlling elements, and organizational structure of the various media. Comparative Canadian material considered where feasible. C-L: Canadian Studies, Comparative Area Studies, and Film and Video. One course. *Smith*
- 171. Comparative Health Care Systems.** The interaction of historical, political, economic, legal/ethical, and sociological factors in the organization and operation of health care systems in the United States, the United Kingdom, Sweden, and elsewhere. C-L: Comparative Area Studies. One course. *Maddox*
- 173. Social Conflict and Social Movements.** Mobilization and strategy of riots, demonstrations, public interest groups, social movements, and revolutions. One course. *Wilson*

175. Contemporary International Problems: Their Historical Origins and Their Implications for Future Policy. C-L: Anthropology 109, Comparative Area Studies, History 109, Interdisciplinary Course 109, Political Science 160, and Religion 156. One course. *Staff*

179. Modern Nationalist Movements. A comparative sociological study of major nationalist movements: Western nationalism in the nineteenth century, anti-Western movements of the Third World, and regional movements within and against established nation-states. C-L: Canadian Studies and Comparative Area Studies. One course. *Tiryakian*

182. Media in Comparative Perspective. See C-L: Interdisciplinary Course 182; also C-L: Comparative Area Studies and Political Science 180. One course. *Paletz or Smith*

184. An Introduction to Canada and Canadian Issues. See C-L: Interdisciplinary Course 184; also C-L: Canadian Studies, Comparative Area Studies, Economics 184, History 184, and Political Science 184. One course. *Cahow*

193, 194. Independent Study. Prerequisite: consent of instructor. One course each. *Staff*

195S, 196S, 197S. Seminar in Special Topics. One course each. *Staff*

For Seniors and Graduates

206. Sociological Theory. Structure, foundations, and historical antecedents of recent formulations of such theoretical approaches as phenomenological sociology, exchange theory, critical theory, structuralism, neo-Marxist sociology, sociobiology, and action theory. One course. *Tiryakian or Wilson*

207. Social Statistics I: Basic Concepts and Methods. Review of descriptive statistics; probability concepts; statistical inference, t-tests, and the analysis of variance. Bivariate correlation and regression, dummy variables, multiple regression, and the analysis of covariance. Stress on applications. Statistical computing using SPSS and other programs. One course. *Land, Manton, or Spenner*

208. Survey Research Methods. Theory and application of survey research techniques in the social sciences. Sampling, measurement, questionnaire construction and distribution, pretesting and posttesting, response effects, validity and reliability, scaling of data, data reduction and analysis. Prerequisite: Sociology 207 or the equivalent. One course. *Back, Kerckhoff, or Smith*

211S. A-E. Proseminars in Sociological Theory. Development of sociological thought; systematic sociological theory; interrelations with other social and behavioral sciences.

- A. Background of Sociology
 - B. Formal Aspects of Theory
 - C. Sociology of Knowledge
 - D. Evolutionary Theory and Sociobiology
 - E. Special Topics in Sociological Theory
- One course. *Tiryakian or Wilson*

212. Social Statistics II: Linear Models, Path Analysis, and Structural Equation Systems. Model specification, review of simple regression, the Gauss-Markov theorem, multiple regression in matrix form, ordinary and generalized least squares, residual and influence analysis. Path analysis, recursive and nonrecursive structural equation models; measurement errors and unobserved variables. Application of statistical computing packages. Prerequisite: Sociology 207 or equivalent. One course. *Land, Manton, or Spenner*

213. Social Statistics III: Discrete Multivariate Models. Assumptions, estimation, testing, and parameter interpretation for the log-linear, logit, logistic, and probit models.

Model comparisons; applications of statistical computing packages and programs. Prerequisite: Sociology 212 or equivalent. One course. *Land, Manton, or Spenner*

214. Comparative and Historical Methods. Scope, methods, and controversies of comparative and historical sociology. C-L: Comparative Area Studies. One course. *Gereffi, Smith, or Tiryakian*

215. Basic Demographic Methods and Materials. Population composition, change, and distribution. Methods of standardizing and decomposing rates, life tables and population models, analysis of data from advanced and developing countries. Applications of computer programs for demographic analysis. Prerequisite: Sociology 207 or equivalent. One course. *Manton or Myers*

216. Advanced Methods of Demographic Analysis. Theory and estimation methods for life tables. Reproductivity, the stable population model. Graduation, interpolation, and other data adjustments for faculty data. Hazards modeling. Applications of computer packages for demographic analysis. Prerequisite: Sociology 215 or equivalent. One course. *Land or Manton*

217S. A-F. Proseminars in Social Statistics and Research Methods. Selected topics in the collection and analysis of social science data.

- A. Discrete and Continuous Models of Measurement
 - B. Hazards Models, Event History Analysis, and Panel Data
 - C. Dynamic Models and Time Series Analysis
 - D. Research Design
 - E. Evaluation Research Methods
 - F. Special Topics in Social Statistics and Research Methods
- One course. *Staff*

221S. A-D. Proseminars in Aging and Life Course Analysis. Selected topics in socialization, human development, status attainment and careers, and the sociology of aging.

- A. Social Structure and the Life Course
 - B. Social Patterns of Personal Development
 - C. Social Gerontology
 - D. Special Topics in Aging and Life Course Analysis
- One course. *Staff*

222S. A-D. Proseminars in Comparative and Historical Sociology. Selected topics in the differentiation and transformation of societies.

- A. Theories of Social Change
 - B. Comparative Aspects of Societal Transformation
 - C. Theories of Change in Third World
 - D. Special Topics in Comparative and Historical Sociology
- One course. *Gereffi, Simpson, Smith, or Tiryakian*

223S. A-E. Proseminars in Criminology, Criminal Justice, and the Sociology of Law. Selected topics in crime and the institutions of social control.

- A. Theories of Crime Causation
 - B. Human Development and Criminal Careers
 - C. Social Control and the Criminal Justice System
 - D. Sociology of Law
 - E. Special Topics in Criminology, Criminal Justice, and the Sociology of Law
- One course. *Land, Simpson, or Wilson*

224S. A-F. Proseminars in Demography, Human Ecology, and Social Epidemiology. Selected topics in population studies.

- A. Population Dynamics

- B. Mortality and Morbidity
 - C. Urbanization and Migration
 - D. Social Epidemiology
 - E. Population and Health Care Systems
 - F. Special Topics in Demography, Human Ecology, and Social Epidemiology
- One course. *Myers*

225S. A-E. Proseminars in Organization, Markets, and Work. Selected topics in complex organizations, the labor process, and changing occupations.

- A. Organizations and Environments
 - B. The Social Psychology of Organizations
 - C. Markets and Market Behavior
 - D. Careers and Labor Markets
 - E. Special Topics in Organizations, Markets, and Work
- One course. *Janoski, O'Rand, or Spenner*

226S. A-H. Proseminars in Social Institutions and Processes. Selected topics in the sociology of institutions and social and institutional behavior.

- A. Social Psychology
 - B. Social Stratification
 - C. Political Sociology
 - D. Sociology of Religion
 - E. Sociology of Science
 - F. Sociology of Education
 - G. Medical Sociology
 - H. Special Topics in Social Institutions and Processes
- One course. *Staff*

234S. Political Economy of Development: Theories of Change in the Third World.

See C-L: Political Science 234S; also C-L: Anthropology 234S, Comparative Area Studies, History 234S, and Interdisciplinary Course 234S. One course. *Bates, Bergquist, Fox, Gereffi, or Smith*

255. Political Sociology. Pluralist, elite, and class theories of the relationship between state and society. Topics include: recent debates on the welfare state, social control, political participation, and state-society relations in socialist economies. C-L: Political Science 255. One course. *Smith or Tiryakian*

282S. Canada. See C-L: Interdisciplinary Course 282S; also C-L: Anthropology 282S, Canadian Studies, Comparative Area Studies, History 282S, and Political Science 282S. One course. *Cahow*

298S, 299S. Seminar in Selected Topics. Substantive, theoretical, or methodological topics. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

140. Environment and Society

189. The Americas: A Survey of the Forces Shaping the Hemisphere

THE MAJOR

Prerequisite. Sociology 10D or an equivalent course with consent of the Director of Undergraduate Studies.

Major Requirements. Eight courses above 101: Sociology 132, 133, 138, one 200-level course, and four others. Only one independent study credit can be applied to the major; it may not substitute for a required course.

A student may complete a second major in sociology. Requirements and advising are the same for the second major as for the first major.

A Handbook for Sociology Majors, available in the office of the Director of Undergraduate Studies, describes areas of concentration, the honors program, and the Sociology Union. It also describes the departmental advising system and the interests of the faculty.

Institute of Statistics and Decision Sciences (STA)

Professor Geweke, *Director*; Associate Professor Burdick; Assistant Professor Lavine; Visiting Professor Richard; Research Associate Professor Wolpert

The Institute of Statistics and Decision Sciences coordinates teaching and research in statistics and decision theory at Duke. It offers various courses in basic statistics and advanced mathematical statistics. The research emphasis on statistical decision theory in the institute leads to its offering a variety of courses, at various levels, in applied game theory, applied decision theory, and Bayesian analysis. There is no undergraduate major in statistics. The institute maintains and runs a Statistical Consulting Center which provides help on statistics problems and projects for members of the Duke community.

10D. Basic Statistics. Statistical concepts involved in making inferences, decisions, and predictions from data. Emphasis on applications, not formal technique. Not open to students who have had Economics 138, Mathematics 53, Political Science 138, Psychology 117, Public Policy Studies 112, or Sociology 133. One course. *Staff*

20. Introduction to Decision Analysis. Frameworks for identifying and analyzing choices and their consequences. Elementary probability theory and applications, utility, risk and decision trees. Introduction to constrained optimization theory and application. One course. *Peterson*

30. Applied Game Theory. Introduction to theory of games through its application to economics, political science, animal behavior, and decision analysis. One course. *Staff*

100. Introduction to Applied Statistics. Classical techniques of testing and estimation. Emphasis on applications of the theory to applied problems. Not open to students who have taken Statistics 200 or equivalent. Prerequisite: Mathematics 103 (may be taken concurrently) or equivalent, or consent of instructor. One course. *Staff*

191, 192. Independent Study. Directed reading and research. Prerequisites: consent of instructor and Director of Undergraduate Studies. One course each. *Staff*

200. Introduction to Statistical Methods. Emphasis on classical techniques of hypothesis testing and point and interval estimation, using the binomial, normal, t , F , and chi square distributions. Not open to students who have taken Economics 237 or Mathematics 117. Prerequisite: Mathematics 103 (may be taken concurrently) or equivalent, or consent of instructor. One course. *Staff*

210. Bayesian Statistics. Foundations of Bayesian theory. Bayesian versus classical inference procedures; applications to simple random processes. Introduction to Bayesian computer software. Prerequisite: Statistics 200 or consent of instructor. One course. *Richard*

220. Decision Analysis. Decision making under uncertainty. Theory and methods of structuring problems, defining uncertainty, and satisfying multiple objectives. Theories of risk, information, and psychological bias. Prerequisite: Statistics 200 or consent of instructor. C-L: Business Administration 491. One course. *Winkler*

240. Applied Stochastic Processes. Prerequisite: Statistics 200 or equivalent. See C-L: Mathematics 240. One course. *Staff*

241. Linear Models. Geometrics, interpretation, multiple regression, analysis of variance, experimental design, analysis of covariance. Prerequisite: Statistics 200 or equivalent. C-L: Mathematics 241. One course. *Staff*

242. Multivariate Statistics. Multinormal distributions, multivariate general linear model, Hotelling's T^2 statistic, Roy union-intersection principle, principal components, canonical analysis, factor analysis. Prerequisite: Statistics 241 or equivalent. C-L: Mathematics 242. One course. *Staff*

243. Econometrics I. See C-L: Economics 243. One course. *Staff*

245. Econometrics II. See C-L: Economics 245. One course. *Staff*

246. Selected Topics in Econometric Theory. See C-L: Economics 246. One course. *Staff*

247S. Applied Econometrics. See C-L: Economics 247S. One course. *Staff*

248, 249. Topics in Statistics. Advanced topics in analysis of variance, design of experiments, nonparametric statistics, foundations of statistical inference. Prerequisite: Statistics 200 or consent of instructor. One course each. *Staff*

Swahili

For courses in Swahili, see Asian and African Languages.

University Writing Program (UWC)

Assistant Professor Gopen, *Director*

The writing requirement may be fulfilled by successfully completing University Writing Course 4, 5, 6, or 7, each of which involves expository themes and regular individual conferences. Despite the distinction in titles and topics, all these courses deal with the same core concerns and have the same objective: they are intended to help students of all abilities to a greater understanding of the language and thereby to a greater control of their thinking process.

4. Principles of Writing. Designed for those who would benefit from a small class that concentrates on the principles of clear, sophisticated, college-level prose. Essays are based on a variety of topics. One course. *Staff*

5. Persuasive Writing. Differs from University Writing Course 4 in only three ways: (1) the essays in each course section are based on a single topic, the readings for which are primarily nonfiction; (2) the class size is slightly larger; and (3) the pace may be somewhat faster. One course. *Staff*

6. Interpretive Writing. Differs from University Writing Course 5 only in that the essays in each course section are based primarily on readings in literature, selected to form a single literary topic for the term. One course. *Staff*

7. Writings on Special Topics. Themes and readings vary with the topic of each section. Enrollment in some sections may be restricted to students in specified programs. One course. *Staff*

For other courses in writing, see listings for Department of English.

Women's Studies Program

Associate Professor J. O'Barr, *Director*

A certificate, but not a major, is available in this program.

The program in women's studies provides for students an understanding of the forces that shape the position of women in society and develops an appreciation of women's experiences. Women's studies brings together faculty and students from many disciplines who share an interest in studying women's experiences and who incorporate ideas and

information about these experiences into research, teaching, and learning. Women's studies encourages students to question and reinterpret existing bodies of information and theories and to include women's perspectives and contributions in the new interpretation.

Courses in women's studies, open to all Duke students, are offered through a number of academic departments and through the interdisciplinary course designation. A certificate, representing an area of concentration supplementing a major, is available for students in the program. Students working toward the certificate declare a major outside the program and utilize women's studies as a valuable additional area of academic concentration. Students earning the undergraduate certificate are eligible for graduation with distinction in women's studies. A list of certificate requirements and guidelines for honors in women's studies are available in the program office.

The courses listed below are offered regularly and can be used to fulfill the requirements for the certificate. For a more detailed description of each course, consult the listing in the appropriate department or contact the Women's Studies Program Office.

REGULARLY SCHEDULED COURSES

Core Interdisciplinary Courses

- Interdisciplinary Course 103. An Introduction to Women's Studies. *J. O'Barr*
- Interdisciplinary Course 195S. Senior Seminar in Women's Studies. *J. O'Barr and staff*
- Interdisciplinary Course 211S. History of Feminist Thought. *Neuschel, J. O'Barr, or Pope*
- Interdisciplinary Course 283S. Feminist Theory and the Humanities. *Clark, Orr, Pope, or Tompkins*
- Interdisciplinary Course 284S. Feminist Theory and the Social Sciences. *Chafe, Neuschel, O'Rand, C. Smith, or Spenner*

Departmental Courses on Women/Gender

- Anthropology 113. Cultural Construction of Gender. *Quinn*
- Anthropology 114. Gender Inequality. *Quinn*
- Anthropology 215S. The Anthropology of Women: Theoretical Issues. *Domínguez, Quinn, or Smith*
- Anthropology 272S. Marxism and Feminism. *Smith*
- Arabic 173. Women in Modern Arabic Literature. *Cooke*
- Classical Studies 104. Women in the Ancient World. *Boatwright*
- Comparative Literature 140. The Great Mother: Archetype or Stereotype? *Wang*
- Comparative Literature 289. Topics in Feminist Theory. *Staff*
- English 269. American Women Writers. *Pope or Tompkins*
- French 108S. French Women: Myths, Realities, and the Law. *Bryan*
- French 159. Feminist Fiction. *Orr*
- History 169S, 170S. The Social History of American Women. *A. Scott*
- History 171. A History of Women in Europe. *Neuschel*
- History 199. History of Women in Science and Medicine. *Green*
- Italian 105. Italian Women Writers. *Finucci*
- Music 120. Women in Music. *Higgins*
- Philosophy 122. Philosophical Issues in Feminism. *Staff*
- Political Science 163. Gender, Politics, and Policy: The Third World Case. *J. O'Barr*
- Psychology 164S. Psychology of Women. *Staff*
- Religion 109. Women in the Biblical Tradition: Image and Role. *C. Meyers*
- Religion 125. Women and Sexuality in the Christian Tradition. *Clark*
- Sociology 118. Sex, Gender, and Society. *O'Rand*

Departmental Courses on Women in Relation to Culture and Society

- Anthropology 110. Advertising and Society. *W. O'Barr*
- Anthropology 126. Middle East: Wars, Revolutions, and Social Change. *Domínguez*
- Anthropology 137. Incest, Adultery, and Other Problems in Kinship and Marriage. *Domínguez or Quinn*
- Anthropology 141. The Self and Others: Ethnic, Racial, and Social Classifications. *Domínguez*
- Anthropology 142. Anthropology and Cultural Bias. *Quinn*
- Anthropology 251S. American Marriage: A Cultural Approach. *Quinn*
- Comparative Literature 128. Writings in the Pan-African Tradition. *Willis*
- Comparative Literature 177. Film Theory. *Gaines*
- Comparative Literature 185. Psychoanalysis, Literature, and Film. *Gaines*
- Economics 208S. Economics of Labor Supply and the Family. *McElroy*
- English 187. Melodrama and Soap Opera. *Gaines*
- English 188. Narrative Film and the Novel. *Gaines*
- History 115. History of Africa. *Ewald*
- History 117. Early Modern Europe. *Neuschel*

History 160. The United States from the New Deal to the Present. *Chafe*
 Interdisciplinary Course 155. Comparative Perspectives on Literature and Social Change: From Plantation to City. *Willis*
 Political Science 129. Political Participation. *Paletz*
 Political Science 153, 154. Politics and the Media of Mass Communication. *Paletz*
 Political Science 187. Politics and the Libido. *Paletz*
 Psychology 116. Social Psychology. *George*
 Religion 234. Early Christian Asceticism. *Clark*
 Sociology 106. Social Psychology. *George*
 Sociology 111. Inequality in America. *Kerckhoff or O'Rand*
 Sociology 149. Sexuality and Society. *Staff*
 Sociology 150. The Changing American Family. *Kerckhoff or Simpson*
 Sociology 155. Work in America. *Simpson or Wilson*
 Sociology 161. Aging and Death. *George*
 Sociology 165. Occupations and Career Development. *Simpson or Spenner*
 Sociology 167. The Social Bases of Politics. *Staff*

OTHER PERTINENT COURSE OFFERINGS

In addition to the regular courses listed above, the following sections of general courses are offered by women's studies faculty members in various departments. These sections focus specifically on topics relevant to women; they count toward the women's studies certificate requirements only when offered on these specific topics by the women's studies faculty members listed here. Also, house courses, taken for half credit through Duke dormitories, are frequently offered and sponsored through the Women's Studies Program. Students should consult the Women's Studies Program each semester for information on all courses.

Departmental Courses on Women/Gender

Anthropology 180. Sociobiology and Gender. *Wright*
 Classical Studies 195S, 196S. Sex Roles in Antiquity. *Boatwright*
 English 26S. American Women's Poetry. *Pope*
 English 26S. Twentieth-Century Identity Novels. *Pope*
 English 179S. Portraits of the Lady: Studies in the Literary Images of Women. *Pope*
 English 179S. Studies in Women's Fiction. *Pope*
 English 287. Feminist Literary Theory. *Pope*
 French 104S. Women in Contemporary France. *Bryan or Orr*
 French 145S. Women Writers of the Renaissance. *Tetel*
 French 290S. Studies in a Contemporary Figure: Wittig. *Orr*
 History 196S. Problems in the History of Women in Europe. *Neuschel*
 History 196S. Issues in Third World Women's History. *Ewald*
 Political Science 200A. Contemporary American Feminism. *J. O'Barr*
 Psychology 171T. Contemporary Feminist Theory. *Staff*
 Public Policy Studies 264S. Women and Justice. *Stack*

Departmental Courses on Women In Relation to Culture and Society

Comparative Literature 282. Structuralism, Poststructuralism, and After. *Tompkins*
 English 26S. Solitary in Fiction. *Pope*
 English 154. American Literature: 1915-1960. *Pope*
 English 163. Twentieth-Century American Poetry. *Pope*
 English 189S. Sexualities in Film and Literature. *Gaines*
 English 288. Western in American Culture. *Tompkins*
 French 141S. Development of Medieval Romance. *Staff*
 French 166, 167. Contemporary French Life and Thought. *Bryan, Kaplan, or Orr*
 Interdisciplinary Course 139. Marxism and Society. *Willis*
 Public Policy 195S. Poverty and Progress. *Stack*
 Public Policy Studies 278. Human Service Bureaucracy. *Stack*
 Spanish 166. Nineteenth-Century Prose Fiction. *Sieburth*

In addition to offering courses and a certificate representing a concentration in women's studies, the Women's Studies Program sponsors lectures, films, discussions, conferences, and internships that focus on women's issues. It provides academic advice and assistance to students earning certificates in the program. Additional information on courses, the women's studies certificate, and other opportunities in women's studies is available at the Office of Women's Studies, 207 East Duke Building.

Writing

See University Writing Program.

Zoology (ZOO)

Professor Gillham, *Chairman*; Professor Fluke, *Director of Undergraduate Studies*; Professors Costlow, Klopfer, Livingstone, McClay, Nicklas, Staddon, Tucker, Vogel, Wainwright, Ward, and H. Wilbur; Associate Professors Forward, Laurie, Lundberg, H. Nijhout, Rausher, Ruderman, and Sutherland; Assistant Professors Roth and Uyenoyama; Professors Emeriti Bailey, Bookhout, Gregg, Schmidt-Nielsen, and K. Wilbur; Adjunct Professor Schmidt-Koenig; Lecturer M. Nijhout

A major is available in this department.

The introductory course, Principles of Biology, is listed under Biology in this bulletin. See also Introductory Animal Diversity, below.

In addition to those courses bearing the S or T suffix, and independent study, the following zoology laboratory courses also count for the requirement for small-group learning experiences: 204L, 216L, 222L, 226L.

COURSES GIVEN ON THE DURHAM CAMPUS

45S. Structure. The structural design principles that underlie function, failure, and fancy in natural and manmade things. Gaps and connections between science and art. Lectures and tasks for minds and hands on worldly designs. Does not count toward the divisional or fields of knowledge requirements. C-L: Institute of the Arts 20S. One course. *Wainwright*

49S. Freshman Seminar. Topics vary each semester offered. One course. *Staff*

74L. Introductory Animal Diversity. Structure, functions, and habits of animals; classification, evolutionary origins, and phylogenetic relationships of major extant groups. One course. *Rausher or Roth*

100. Perspectives on Living Systems. For upperclass students not intending majors in a biological science. Not open to students who have taken Biology 14L. May be substituted for Biology 14L only with the consent of the Director of Undergraduate Studies in zoology. One course. *Staff*

103L. Principles of Ecology. Physical, chemical, and biological processes that determine the distribution and abundance of animals, emphasizing population dynamics, species interaction, biogeography, nutrient cycling, and energy flow through food webs. Laboratory includes fieldwork. Prerequisites: introductory biology and Mathematics 31. One course. *Livingstone*

108L. Developmental and Comparative Anatomy of Vertebrates. The embryology, anatomy, and evolutionary development of vertebrate organ systems. Prerequisite: introductory biology. One course. *Lundberg*

111. Learning and Adaptive Behavior. Prerequisite: none, but some knowledge of quantitative science desirable. See C-L: Psychology 111. One course. *Staddon*

120. Principles of Evolution. Prerequisite: introductory biology. See C-L: Botany 120. One course. *Antonovics*

145. Physical Radiations and Biological Significance. Kinds of physical radiations, related biological hazards and benefits. Levels of concern for plants and animals, including humans. Protection, cellular repair processes. Prerequisites: introductory biology and Chemistry 12. One course. *Fluke*

149. Comparative Biomechanics. The structure and operation of organisms in relation to the mechanics of solids and fluids. Not open to students who have taken Zoology 249. Prereq-

quisites: Physics 51 and Mathematics 31 or equivalents. One course. *Vogel and Wainwright*

151L. Principles of Physiology. Functional aspects of respiration, circulation, neural and hormonal coordination, water balance, metabolism, thermoregulation, and responses to special environments. Prerequisites: introductory biology and Chemistry 12. One course. *Tucker or staff*

160. Principles of Cell Biology. Structure and function of organelles, metabolism, and regulatory mechanisms. Prerequisites: introductory biology and Chemistry 12. C-L: Botany 162. One course. *Kohorn, McClay, or M. Nijhout*

160L. Principles of Cell Biology. See Zoology 160. Includes laboratory. C-L: Botany 162L. One course. *Kohorn, McClay, or M. Nijhout*

164. The Molecular Biology of Development. Principles and problems of development and differentiation. Fertilization and early development; molecular and cellular mechanisms of determination, lineage determinism, embryonic induction and differentiation; developmental genetics, morphogenesis, and pattern formation. Includes attention to current literature. Prerequisites: introductory biology and Chemistry 12. C-L: The University Program in Genetics. One course. *Ruderman*

180. Principles of Genetics. Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisite: introductory biology. C-L: Botany 180 and The University Program in Genetics. One course. *Antonovics, Boynton, and Gillham*

181, 182. Independent Study in Genetics. Directed reading and research under the supervision of faculty instructors from The University Program in Genetics, subject to supervisory attention also from Zoology faculty. For juniors and seniors, subject to consent of Director of Undergraduate Studies. Variable credit. *Staff*

191, 192. Independent Study. For junior and senior majors with consent of Director of Undergraduate Studies and supervising instructor. Three courses of 191, 192, 193T, and 194T, maximum. Variable credit. *Staff*

193T, 194T. Tutorial. For junior and senior majors with consent of Director of Undergraduate Studies and supervising instructor. Three courses of 191, 192, 193T, and 194T, maximum. Variable credit. *Staff*

196D. Human Sex and Sexuality. Anatomical, physiological, and psychological aspects of sexuality. Weekly lectures by specialists. Does not satisfy major, divisional, or fields of knowledge requirements. Pass/fail grading only. Half course. *Klopfer and staff*

For Advanced Undergraduates and Graduates

200. Advanced Neuroscience I. Prerequisite: Psychology 103. See C-L: Interdisciplinary Course 200; also C-L: Psychology 200. One course. *Cant and McClay*

201L. Animal Behavior. Survey of past developments and current controversies in animal behavior. Extensive readings, followed by individual experimental or descriptive projects in the laboratory or field (or Primate Center). Recommended background: Zoology 74L, Zoology 151L, and Statistics 200, or equivalents. One course. *Klopfer*

204L. Community Ecology. Mechanisms that determine the distribution and abundance of plants and animals: geology, climate, physiography, soils, competition, predation, and history. Lectures focus on ecological principles. Seminars and weekend field trips. Prerequisites: an introductory ecology course and consent of instructor. C-L: Botany 267L. One course. *Christensen and Wilbur*

206S. Controversies in Biology. A contentious theme for reading, discussion, and an individual or joint paper. Illustrative past topics: the nature of the creative process,

causality in biological thought, the lack of political impact of many scientific developments. Open to nonmajors. One course. *Klopper*

216L. Limnology. Lakes, ponds, and streams; their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal communities. Laboratory includes field trips. Prerequisites: introductory biology and Chemistry 12 and Mathematics 32 and physics or consent of instructor. One course. *Livingstone*

222L. Entomology. The biology of insects: diversity, development, physiology, and ecology. Field trips. Prerequisite: introductory biology. One course. *H. Nijhout*

226L. Ichthyology. Diversity, evolution, natural history, and ecology of fishes. Laboratory includes overnight field trips to marine and freshwater habitats. Prerequisites: introductory biology and Zoology 108L. One course. *Lundberg*

233. Principles of Insect Behavior. Processes governing the behavior of animals as illustrated by insects. Neural integration, communication, genetics, ecology, and evolution of individual and social behavior. Invertebrate zoology or entomology recommended. One course. *Rausher*

234S. Problems in the Philosophy of Biology. Prerequisite: consent of instructor. See C-L: Philosophy 234S; also C-L: Botany 234S. One course. *Brandon (philosophy)*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: introductory biology and one course in animal or plant diversity. C-L: Botany 237L. One course. *Lundberg and Mishler*

244. Principles of Immunology. An introduction to the molecular and cellular basis of the immune response. Topics include anatomy of the lymphoid system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms, and control of immune responses. Prerequisites: Zoology 160 and Chemistry 151 and consent of instructor. C-L: Microbiology and Immunology 244. One course. *Amos, McClay, and staff*

245S. Radiation Biology. The biological effects of ionizing radiations: classical concepts in the context of recent research papers. Analytical uses of radiation. Prerequisites: introductory biology, Chemistry 11, 12, and Physics 51, 52. One course. *Fluke*

247S. Photobiology. Effects of visible light and of ultraviolet and near ultraviolet radiation in living systems: repair processes, quantum processes, physical optics. Prerequisites: college physics and introductory biology. One course. *Fluke*

249. Comparative Biomechanics. The structure and operation of organisms in relation to the mechanics of solids and fluids, including readings from the primary literature. Not open to students who have taken Zoology 149. Prerequisites: Physics 51 and Mathematics 31 or equivalents. One course. *Vogel and Wainwright*

259L. Laboratory in Biomechanics. Introduction to instruments used in investigations of solid and fluid biomechanics. Exercises and individual projects. Prerequisite: Zoology 249. One course. *Vogel and Wainwright*

269. Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Botany 269, Microbiology and Immunology 269, and The University Program in Cell and Molecular Biology. One course. *McClay and staff*

281S. DNA, Chromosomes, and Evolution. The relationship of chromosome and DNA-sequence organization with evolution; karyotype changes and speciation; repetitive DNA, split genes, transposable elements, and evolutionary mechanisms; phylogeny

reconstruction; evolution of mitosis and the chromosome cycle. Prerequisite: Zoology 160, 180, or Botany 105. One course. *Laurie and Nicklas*

283. Extrachromosomal Inheritance. Genetics, biochemistry, and molecular biology of the organelles of eukaryotic cells, and cellular symbionts. Emphasis on recent literature. Prerequisite: introductory genetics. C-L: Botany 283 and The University Program in Genetics. One course. *Boynton and Gillham*

286. Evolutionary Mechanisms. Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Prerequisites: either Botany 145L/245L or Zoology 74L, and a course in genetics. C-L: Botany 286 and The University Program in Genetics. One course. *Antonovics, Uyenyoyama, and H. Wilbur*

287S. Macroevolution. Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Botany 287S. One course. *Mishler and Roth*

288. Mathematical Population Genetics. Principles of formulation and analysis of dynamic mathematical models of genetic evolution. Rotating topics include: mating systems, sex ratio, stochastic processes. Calculus required; statistics and linear algebra recommended. C-L: The University Program in Genetics. One course. *Uyenyoyama*

293L. Population Biology. Theoretical approach to population genetics, life table mathematics, life-cycle evolution in plants and animals, population dynamics, and regulation. Laboratories emphasize experimental methods. Individual projects and week-end field trips. Prerequisites: calculus and ecology and consent of instructor. C-L: Botany 293L. One course. *Antonovics and Wilbur*

295S, 296S. Seminar. Topics, instructors, and course credits announced each semester. Variable credit. *Staff*

COURSES GIVEN AT BEAUFORT

Consult Marine Sciences in this bulletin for offerings at the Duke University Marine Laboratory, Beaufort, North Carolina, and for details of the fall, spring, and summer programs for undergraduates at Beaufort.

76L. Marine Invertebrate Diversity. Form, function, and evolution of invertebrates from estuarine and coastal habitats. Laboratory study of perception, feeding, digestion, respiration, locomotion, reproduction, and development. Field study of adaptations to natural environments. Not open to students who have taken Zoology 176L or 274L. Prerequisite: introductory biology. C-L: Marine Sciences. One course. *Kirby-Smith (marine sciences)*

113L. Behavioral Ecology. How ecological factors shape foraging, mating, aggressive and social behavior. Laboratory experiments and field observations from the Outer Banks environment. Independent projects and seminars. Not open to students who have taken Zoology 213L. Prerequisite: introductory biology. C-L: Marine Sciences. One course. *Rubenstein*

114L. Biological Oceanography. Physical, chemical, and biological processes of the oceans, emphasizing special adaptations for life in the sea and factors controlling distribution and abundance of organisms. Laboratory emphasis. One course (spring); one and one-half courses (summer). Prerequisite: introductory biology. C-L: Botany 114L and Marine Sciences. Variable credit. *Ramus and staff*

150L. Physiology of Marine Animals. Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prereq-

quisites: introductory biology and chemistry. C-L: Marine Sciences. One course. *Forward*

169L. Marine Communities. Dynamics of marine communities in the context of current ecological theory. Life history strategies, competition, predation, diversity, and stability; detailed considerations of benthic and pelagic communities. Students may not receive credit for both Zoology 103L and 169L. Prerequisites: introductory biology and Mathematics 31. C-L: Marine Sciences. One course. *Sutherland*

176L. Marine Invertebrate Zoology. Structure, function, and development of invertebrates collected from estuarine and marine habitats. Not open to students who have taken Zoology 76L or 274L. Prerequisite: introductory biology. One and one-half courses. *Kirby-Smith (marine sciences)*

For Advanced Undergraduates and Graduates

203L. Marine Ecology. Application of ecological theory to marine systems. Mathematical properties of population growth and species interactions; field and laboratory projects with computer-assisted analysis of data. Practice in scientific writing. Readings from current scientific publications. Prerequisites: introductory biology or invertebrate zoology and calculus; knowledge of statistics recommended. C-L: Marine Sciences. One and one-half courses. *Hay (visiting summer faculty)*

215L. Primary Productivity in the Seas. Prerequisites: introductory biology and chemistry. See C-L: Botany 215L; also C-L: Marine Sciences. One course. *Ramus*

274L. Marine Invertebrate Zoology. Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips. Not open to students who have taken Zoology 76L or 176L. Prerequisite: introductory biology. C-L: Marine Sciences. One and one-half courses. *Ruppert (visiting summer faculty)*

278L. Invertebrate Developmental Biology. Gametogenesis, fertilization, and development of invertebrates, with emphasis on experimental studies of prelarval stages. Prerequisite: consent of instructor. C-L: Marine Sciences. One and one-half courses. *McClay and visiting staff*

COURSES CURRENTLY UNSCHEDULED

107. Heredity

178. Functional Morphology

179T. Tutorial in Functional Morphology

THE MAJOR

Students may obtain a copy of the *Handbook for Zoology Majors* from the office of the Director of Undergraduate Studies. The handbook describes the advising system and special programs, and gives the interests and background of the faculty. Possible areas of concentration are molecular and cellular biology, organismic biology, population biology, animal behavior, ecology, and marine sciences.

For the A.B. Degree

Prerequisite. Biology 14 or consent of Director of Undergraduate Studies.

Corequisites. Zoology 74L or 76L or equivalent; Mathematics 31 or 33 and 32 or 34, or Mathematics 41; Chemistry 11 and 12, or 23, or 31S, and 151; and Physics 51, 52.

Major Requirements. A minimum of eight courses, not including the above prerequisites and corequisites, but including at least five zoology courses; four of these must be other than independent study, tutorials, or seminars, and at least two must have related laboratory experience (not including Zoology 74L). The zoology courses must repre-

sent at least three of these five areas: genetics, cell biology, physiology, ecology, and evolution. The eight courses may include as many as three nonzoology courses taken in appropriate related departments at the 100 level or above (in chemistry, above Chemistry 151L), which have prior approval of the Director of Undergraduate Studies for zoology. (See *Handbook for Zoology Majors* for a listing of such courses already approved.) No one course may be used to satisfy the requirements for zoology and another major, or for a zoology major and a second or third division distributional requirement.

For the B.S. Degree

Prerequisite. Biology 14 or consent of Director of Undergraduate Studies.

Corequisites. Zoology 74L or 76L or equivalent; Mathematics 31 or 33 and 32 or 34, or Mathematics 41; Chemistry 11 and 12, or 23, or 31S, and 151; and Physics 51, 52.

Major Requirements. Same as the A.B. degree requirements except that a minimum of nine courses, not including the above prerequisites and corequisites, is required. These may include as many as four nonzoology courses taken in appropriate related departments. All other qualifications and restrictions are identical with those for the A.B. degree.

Other Major Programs

As an alternative to the above programs, a student with unusual interests in zoology may arrange a negotiated concentration of study. After appropriate discussion with departmental faculty, a student may devise a program of study which must be endorsed by two members of the faculty and approved by the undergraduate director. The statement of the proposed program must make clear why the negotiated major is more appropriate than a conventional major. Such a program must be arranged before the start of a student's fifth semester. The only formal limitation on this approach to the major is that it include at least five courses in zoology to meet the minimum Trinity College requirements. See the *Handbook for Zoology Majors* for additional details.

An interdepartmental program may be pursued instead of a departmental major. The Director of Undergraduate Studies for zoology may arrange administrative responsibility for such programs. See requirements under Biology for the major in biology.

Honors

The department offers a program for graduation with distinction in zoology. See the section on honors in this bulletin. The Director of Undergraduate Studies can provide more details.

School of Engineering

Professor Dowell, *Dean*; Professor Shepard, *Associate Dean*

ENGINEERING (INTERDEPARTMENTAL) (EGR)

23. Principles and Practices in Engineering Economics. Introduction to the principles and practices in engineering economics. The initial set of lectures develops a general understanding of basic engineering economics and break-even analysis/minimum cost in engineering design. The second set of lectures focuses on industrial practices and public projects: interest formulas, annual and present worth, as well as taxes and depreciation. The final lectures address forecasting and uncertainty in engineering economics. (1.0 ES) *Prerequisite:* sophomore standing. One course. *Peirce*

24. Environmental Engineering Science. Materials and energy balances applied to environmental engineering problems. Water pollution control, applied ecology, air quality management, solid and hazardous waste control. Environmental ethics. (1.0 ES) *Prerequisite:* Chemistry 11. One course. *Vesilind*

50. Introduction to Numerical Computing. Introduction to the use of computers in the solution of engineering and scientific problems. Systematic methods for algorithm development and coding in a higher-level computer language. Application of selected numerical methods. Offered in summer only. One course. *Pas*

51. Computers in Engineering. Introduction to use of digital computers in engineering. Attributes of digital computer systems; program languages; algorithm development; numerical analysis, including approximation and interpolation, searches and maximization, linear equations; applications to engineering; interactive computing, editing, and file handling; computer graphics. Not open to students who have completed Computer Science 51 or Engineering 52. (1.0 ES) One course. *Elliott, Melosh, Pas, or Utku*

52. Computational Methods in Engineering. Introduction to computer methods and algorithms for analysis, simulation, and optimization of engineering systems; matrix, direct, and iterative analysis techniques; finite increment techniques; linear programming. Requires prior programming experience and learning FORTRAN or Pascal type languages with minimal help from the course. Not open to students who have completed Computer Science 51 or Engineering 51. (1.0 ES) One course. *Melosh or Utku*

75. Mechanics of Solids. Analysis of force systems and their equilibria as applied to engineering systems. Stresses and strains in deformable bodies; mechanical behavior of materials; applications of principles to static problems of beams, torsion members, and columns. Selected laboratory work. (1.0 ES) Prerequisites: Physics 51 and Mathematics 32. One course. *Hueckel, Melosh, Petroski, or J. F. Wilson*

83. Structure and Properties of Solids. Introduction to materials science and engineering, emphasizing the relationships between the structure of a solid and its properties. Atomic and molecular origins of electrical, mechanical, and chemical behavior are treated in some detail for metals, alloys, polymers, ceramics, glasses, and composite materials. (.25 ED/.75 ES) Prerequisites: Chemistry 11 and Mathematics 31. One course. *Cocks, Gösele, Jones, Needham, Pearsall, Shepard, or Tan*

101. Thermodynamics. The principal laws of thermodynamics for open and closed systems and their application in engineering. Properties of the pure substance, relationships among properties, mixtures and reactions. Principles and applications of statistical thermodynamics. (1.0 ES) Prerequisite: Physics 52. One course. *Bejan or Harman*

123. Dynamics. Principles of dynamics of particles, rigid bodies, and selected non-rigid systems with emphasis on engineering applications. Kinematic and kinetic analysis of structural and machine elements in a plane and in space using graphical and analytical vector techniques. Absolute and relative motion analysis. Work-energy; impact and impulse-momentum. Introduction to vibrations and Lagrange's equations. (1.0 ES) Prerequisites: Mathematics 103 and Engineering 75 or consent of instructor. One course. *Petroski or J. F. Wilson*

130. Modeling and Analysis of Dynamic Systems. Mathematical modeling of mechanical, electrical, fluid, and thermal systems. Emphasis is placed on a universal approach to system analysis. Topics include: state variables, linearization methods, transfer functions and block diagrams, and feedback techniques for the control of dynamic systems. (.25 ED/.75 ES) Prerequisites: Mathematics 103 and Physics 51. One course. *Garg, Quinlan, or Wright*

135. Continuum Mechanics. The concept of continua. Vectors. Cartesian tensors. Stress, deformation, and velocity fields. Constitutive equations. Mechanical properties of solids and fluids. Simple problems in elasticity, viscoelasticity, and plasticity. (.25 ED/.75 ES) Prerequisites: Mathematics 104 or 111 and Physics 51. One course. *Petroski*

150. Engineering Communication. Principles of written and verbal technical communication; graphics, mapping, surveying and engineering drawing. Computer graph-

ics, two- and three-dimensional transformations, hidden-surface and hidden-line algorithms, and computer aided design. (1.0 ES) Prerequisite: Engineering 51 or equivalent. One course. *Pas and Vesilind*

151. Computer Simulations in Engineering. Simulation of various engineering systems, starting from their mathematical formulations. Simulation of the boundary value, eigenvalue, and the initial value problems. Examples from the beam-, truss-, and plate-theories, the fluid flow, the heat transfer, and the dynamics of mechanical and electrical systems. Use of widely used numerical algorithms. Identification of the problems associated with numerical simulations. (1.0 ES) Prerequisite: junior standing in engineering. One course. *Utku*

165. Special Topics in Engineering. Study arranged on special engineering topics in which the faculty have particular interest and competence as a result of research or professional activities. Quarter course, half course, or one course. Prerequisite: consent of instructor(s). Variable credit. *Staff*

174. Technology Assessment and Social Choice. Societal, economic, environmental, psychological, and ethical considerations in the design and application of technological systems; techniques for technological forecasting and assessment; citizen participation in policy making; recent case studies; interdisciplinary team project. (.75 ED/.25 ES) C-L: Religion 174. One course. *Garg and McCollough*

175. Aesthetics, Design, and Culture. An examination of the role of aesthetics, both as a goal and as a tool, in a culture which is increasingly dependent on technology. Visual thinking, perceptual awareness, experiential learning, conceptual modeling, and design will be explored in terms of changes in sensory environment. Design problems will be formulated and analyzed through individual and group design projects. (.5 ED/.5 ES) One course. *Pearsall*

183, 184. Projects in Engineering. Courses in which engineering projects of an interdisciplinary nature are undertaken. The projects must have engineering relevance in the sense of undertaking to meet human need through a disciplined approach under the guidance of a member of the engineering faculty. Prerequisite: consent of instructor. One course each. *Staff*

COURSES CURRENTLY UNSCHEDULED

170. Forecasting Techniques

172A. Contemporary Science: Issues and Challenges

172B. Contemporary Technology: Issues and Challenges

187. History of Nuclear Energy: Civilian Applications

188. History of Nuclear Energy: Military Applications

Biomedical Engineering (BME)

Professor McElhane, *Chairman*; Professor Clark, *Director of Undergraduate Studies*; Professors Barr, Hammond, Hochmuth, Nolte, Pilkington, Plonsey, von Ramm, and Wolbarsht; Associate Professors Burdick, Jaszczak, and Riederer; Assistant Professors Daniels, Reichert, Smith, Trahey, and Truskey; Research Professor Thurstone; Research Assistant Professors Bohs, Cusma, Krassowska, Nandedkar, and Paver; Adjunct Associate Professor Joost

A major is available in this department.

Biomedical engineering is the discipline in which the physical, mathematical, and engineering sciences and associated technology are applied to biology and medicine.

Contributions range from modeling and simulation of physiological systems through experimental research to solutions of practical clinical problems. The undergraduate program in biomedical engineering is flexible and can satisfy the requirements for entrance into graduate work in engineering, physiology, biology, or medicine.

Opportunities for student research are available in the biomedical engineering laboratories. The department utilizes digital computers extensively, and computer science techniques are applied in acquiring, processing, and modeling biological data. Research in the biomedical materials laboratory is directed toward the development of materials suitable for use in biological environments such as the vascular system. Biomedical engineering in pediatric cardiology involves study of the electrical activity of the heart and heart tissues in animals and humans, to increase the basic knowledge of their normal and abnormal behavior. Other electrophysiological systems are examined through the application of models and simulation techniques. The ultrasound imaging laboratories are employed for research and instruction in the biomedical application of this important technique. Ultrasound instrumentation measures and images biological tissue structures, and the laboratories are equipped with a variety of advanced ultrasonic imaging instruments. A transducer fabrication facility, test equipment for the design and construction of advanced ultrasound systems, a dedicated VAX 11/780 computer for image processing, and extensive video recording and display facilities are available. Other areas of research and instruction in medical imaging include digital angiography and MR imaging. The biomechanics laboratory is equipped to measure biomechanical responses of tissues and organs and gait parameters, and to test protective headgear and develop new prosthetic devices.

101. Electrobiolology. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. (.25 ED/.75 ES) Prerequisite: Biomedical Engineering 163 or Electrical Engineering 62. One course. *Barr or Plonsey*

106. Mass and Energy Balances in Chemical and Biological Systems. Engineering problems involving material and energy balances taken from chemical and biochemical process industries and mammalian physiology. Batch and continuous reactive systems in the steady and unsteady state. Humidification processes. Metabolism. (.5 ED/.5 ES) Prerequisite: Chemistry 12. One course. *Clark*

110. Introductory Biomechanics. Static and dynamic analysis of biological systems; analysis of gait and locomotion; ballistocardiography; biomechanical aspects of various sport activities, diving, and jumping; power, work, and energy concepts applied to the human body; strength and properties of tissue; and injury mechanisms and tolerance. (.25 ED/.75 ES) Prerequisites: Mathematics 32 and Physics 51. One course. *McElhaney*

145. Chemical Thermodynamics. Thermodynamic properties and thermodynamic state. Exchange of heat and work in quasi-equilibrium processes. Chemical and phase equilibria of multicomponent mixtures. (.5 ED/.5 ES) Prerequisite: junior standing. One course. *Clark, Daniels, or Truskey*

163, 164. Biomedical Electronics and Measurements. A study of the basic principles of biomedical electronics and measurements with emphasis on the operational performance and selection of transducers, instruments, and systems for biomedical data acquisition and processing. Selected laboratory work emphasizes the measurements of specific physiological events. (.5 ED/.5 ES each) Prerequisite: Electrical Engineering 61. One course each. *Hammond, Trahey, or von Ramm*

171. Signals and Systems. Convolution, deconvolution, Fourier series, Fourier transform, sampling, and the Laplace transform. Continuous and discrete formulations with emphasis on computational and simulation aspects and selected biomedical examples. (1.0 ES) One course. *Pilkington*

191, 192. Projects in Biomedical Engineering. For seniors who express a desire for such work and who have shown aptitude for research in one area of biomedical engineering. Half course to two courses. (.5 ED/.5 ES) Variable credit. *Staff*

201. Electrophysiology. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. Students choose a relevant topic area for detailed study and report. Not open to students who have taken Biomedical Engineering 101 or equivalent. (.25 ED/.75 ES) One course. *Barr or Plonsey*

205, 206. Microprocessors and Digital Instruments. Design of microcomputer-based devices including both hardware and software considerations of system design. Primary emphasis on hardware aspects, including a progression through initial design, prototype construction in the laboratory, testing of prototypes to locate and correct faults, and final design evaluation. Evaluation includes examination of complexity, reliability, and cost. Design and construction oriented toward biomedical devices or instruments that include dedicated microcomputers, usually operating in real time. (.5 ED/.5 ES each) Prerequisites: for 205, Engineering 51 and Biomedical Engineering 163, 164 or equivalent; for 206, satisfactory work in 205. One course each. *Barr, Hammond, or von Ramm*

207. Transport Phenomena in Biological Systems. An introduction to the modeling of complex biological systems using principles of advanced transport and kinetic process analyses. A continuum approach will be used to analyze multicomponent mass transport and reactions in systems found in biotechnological and biomedical applications. Systems considered will include facilitated versus active transport of nutrients across membranes, lung oxygen transport models, artificial kidney design (external membrane dialysis and peritoneal dialysis), electrophoresis, pulsatile flow in arterial systems, attached enzyme reactions, and microbial adhesion to solid surfaces. (.25 ED/.75 ES) C-L: Civil Engineering 207 and Mechanical Engineering 207. One course. *Bryers, Daniels, or Hochmuth*

211. Theoretical Electrophysiology. Mathematical analysis of intracellular and extracellular currents and voltages arising from subthreshold and transthreshold stimuli applied to excitable tissue (cardiac and striated muscle and nerve). Bases for and behavior of models of cardiac tissue utilizing discrete and continuous formulations. Evaluation of sources of extracellular fields. Description and evaluation of models of membrane behavior. Laboratory exercises based on computer simulation, with emphasis on quantitative behavior and design. Readings from original literature. (.5 ED/.5 ES) Prerequisite: Biomedical Engineering 101 or 201. One course. *Barr or Plonsey*

212. Theoretical Electrocardiography. Mathematical analysis of currents flowing between the cardiac and body surfaces. Consideration of cardiac models, inhomogeneities, and surface lead systems. Examination of lead systems, and the interpretation of body surface measurements using inverse calculations. Laboratory exercises based on computer simulation with emphasis on quantitative behavior and design. Readings from original literature. (.5 ED/.5 ES) Prerequisite: Biomedical Engineering 101 or 201. One course. *Barr or Plonsey*

215. Biomedical Materials and Artificial Organs. Chemical structures, processing methods, evaluation procedures, and regulations for materials used in biomedical applications. Applications include implant materials, components of ex vivo circuits, and cosmetic prostheses. Primary emphasis on polymer-based materials and on optimization of parameters of materials which determine their utility in applications such as artificial kidney membranes and artificial arteries. (.5 ED/.5 ES) Prerequisite: Engineering 83 or Chemistry 151 or consent of instructor. C-L: Mechanical Engineering 215. One course. *Clark*

222. Principles of Ultrasound Imaging. Propagation, reflection, refraction, and diffraction of acoustic waves in biologic media. Topics include geometric optics, physical optics, attenuation, and image quality parameters such as signal-to-noise ratio, dynamic range, and resolution. Emphasis is placed on the design and analysis of medical ultrasound imaging systems. (.5 ED/.5 ES) Prerequisites: Physics 52 and Mathematics 111. One course. *von Ramm*

230. Biomechanics. Basic elements of mechanics are developed with application in biomechanics. Primary emphasis is given to trauma mechanisms, injury criteria, and human protection. Head and neck injuries and helmet design are discussed. Case studies from product liability lawsuits with a strong biomechanics context are discussed in a seminar mode. (.5 ED/.5 ES) One course. *McElhaney*

233. Modern Diagnostic Imaging Systems. The underlying concepts and instrumentation of several modern medical imaging modalities. Review of applicable linear systems theory and relevant principles of physics. Modalities studied include X-ray radiography (conventional film-screen imaging and modern electronic imaging), computerized tomography (including the theory of reconstruction), and nuclear magnetic resonance imaging. (.5 ED/.5 ES) Prerequisite: consent of instructor. One course. *Riederer*

235. Acoustics and Hearing. The generation and propagation of acoustic (vibrational) waves and their reception and interpretation by the auditory system. Topics under the heading of generation and propagation include free and forced vibrations of discrete and continuous systems, resonance and damping, and the wave equation and solutions. So that students may understand the reception and interpretation of sound, the anatomy and physiology of the mammalian auditory system are presented; and the mechanics of the middle and inner ears are studied. (.5 ED/.5 ES) Prerequisites: Physics 52 and Mathematics 111 or equivalents. One course. *Trahey*

243. Computers in Biomedical Engineering. An in-depth study of the use of computers in biomedical applications. Hardware, software, and applications programming. Data collection, analysis, and presentation studied within application areas such as monitoring, medical records, computer-aided diagnoses, computer-aided instruction, M.D.-assistance programs, laboratory processing, wave form analysis, hospital information systems, and medical information systems. (.5 ED/.5 ES) One course. *Hammond*

265. Advanced Topics in Biomedical Engineering. Advanced subjects related to programs within biomedical engineering tailored to fit the requirements of a small group. (.5 ED/.5 ES) Prerequisite: consent of instructor. One course. *Staff*

COURSES CURRENTLY UNSCHEDULED

204. Measurement and Control of Cardiac Electrical Events

THE MAJOR

The major requirements are included in the minimum total of thirty-four courses listed under general requirements and departmental requirements. The following specific courses must be included: Biomedical Engineering 101, 110, 163, 164, and 207.

Civil and Environmental Engineering (CE)

Professor Vesilind, *Chairman*; Associate Professor Peirce, *Director of Undergraduate Studies*; Professors Melosh, Petroski, S. Utku, and J. F. Wilson; Associate Professors Biswas, Bryers, Hueckel, Medina, Pas, and Reckhow; Assistant Professor Marin; Adjunct Professors Kranich and Saibel; Adjunct Associate Professor B. Utku; Visiting Assistant Professor Elliott

A major is available in this department.

Civil and environmental engineering is one of the broadest of the engineering disciplines, extending across mathematics and the natural sciences, including physics, biology, and chemistry, and emphasizing the social and management sciences. Civil and environmental engineers develop expertise in these disciplines to research, plan, design, and construct solutions to problems faced in modern life by both the public and private sectors. These solutions vary widely in nature, size, and scope; space satellites and launching facilities, offshore structures, environmental controls to protect public health, nuclear and conventional power stations, bridges, dams, buildings, tunnels, highways, and mass transportation systems.

Eight major specialty areas at Duke enjoy national and international reputations for quality at both the undergraduate and graduate levels of study:

- environmental engineering: hazardous waste disposal, solid waste processing, biotechnology, and water supply and wastewater treatment to protect public health and the environment;

- mechanics: the behavior of solid and fluid materials under selected conditions of loading and environment;

- structural engineering: the economical and safe design of engineered structures;

- ocean engineering: the development and utilization of marine resources;

- urban and regional engineering: a broad spectrum of integrated land and city planning and mass transportation;

- water resources: the use, preservation, and management of surface and ground-water supplies;

- geotechnical engineering: the interaction between structures and the supporting soil and rock;

- architectural engineering: interaction between engineering design and artistic representation of structures.

In addition, students may elect a general program in civil and environmental engineering studies, and/or pursue a degree with a double major in civil engineering and another department at Duke. The list of recently completed double majors indicates the diversity and breadth of interests shared by civil and environmental engineers: public policy studies, economics, business, French, and music.

The Civil and Environmental Program at Duke is supported by prominent faculty as well as modern laboratory and instructional facilities. The professors in the Department of Civil and Environmental Engineering are committed to quality classroom lectures and laboratory experiences in settings which encourage student-student and student-faculty interactions. The same professors conduct research of national and international consequence.

Laboratory facilities in the Department are comparable to those found in other major universities. For example, computers are relied upon for data collection and analysis. Chemical and biological testing apparatus are utilized in the laboratory for teaching and research activities, and electronic measurement equipment is designed, constructed, and applied in many of the specialty areas mentioned above.

Students in the Department of Civil and Environmental Engineering may spend their junior year studying at University College London. Courses taken under this program will be graded and counted toward the Duke BSE degree. Applications should be made through the Director of Undergraduate Studies in the department.

Recent graduates from the Department of Civil and Environmental Engineering have selected from a wide range of possible career paths. Graduate study in engineering or in such fields as business and architecture is often pursued by Duke graduates. Many other graduates accept positions with major corporations as well as federal, state, and local government agencies as design engineers and project managers.

101. Structural Engineering in Perspective. How structures work, and why they sometimes fail. An introduction to the engineering method, especially as applied to the design and analysis of civil engineering structures. Open to engineering and nonen-

gineering students alike. (.5 ED/.5 ES) Prerequisite: consent of instructor. One course. *Petroski*

116. Transportation Engineering. The role and history of transportation. Introduction to the planning and design of multimodal transportation systems. Principles of traffic engineering and route location and design. Planning studies and economic evaluation. (.5 ED/.5 ES) Prerequisites: junior or senior standing and consent of instructor for nonengineering students. One course. *Pas*

122. Fluid Mechanics. Physical properties of fluids; fluid-flow concepts and basic equations; continuity, energy, and momentum principles; dimensional analysis and dynamic similitude; viscous effects; applications emphasizing real fluids. Selected laboratory work. (1.0 ES) Corequisite: Engineering 123. One course. *Medina*

123. Water Resources Engineering. Descriptive and quantitative hydrology, hydraulics of pressure conduits and measurement of flow, compound pipe systems, analysis of flow in pressure distribution systems, open channel flow, reservoirs and distribution system storage. Groundwater hydrology and well-hydraulics. Probability and statistics in water resources. Selected laboratory and field exercises, computer applications. (.15 ED/.85 ES) Prerequisite: Civil Engineering 122. One course. *Medina*

124. Environmental Engineering. Qualitative and quantitative physical, chemical, and bacteriological characterization of water and wastewater. Introduction to water treatment processes and wastewater collection, treatment and disposal systems. Air pollution control; solid and hazardous waste management. Laboratory included. Field trips to be arranged. (.75 ED/.25 ES) Prerequisite: Civil Engineering 123. One course. *Bryers, Peirce, or Vesilind*

127. Environmental Pollution Control. A study of the environmental causes and effects of air, land, and water pollution. Interactions between the environment and stresses to which it is subjected as a consequence of growth and concentration of populations and their increasing demands on natural resources. Solid waste, recycling, noise pollution, and environmental ethics. Not open to engineering majors. (1.0 ES) One course. *Peirce or Vesilind*

131. Theory of Structures. Application of mechanics to the analysis of plane and space structures; a unified treatment of statically determinate and indeterminate structural systems. (.15 ED/.85 ES) Prerequisites: Mathematics 103 and Engineering 75. One course. *Biswas or Melosh*

133. Structural Design I. Nonhomogenous materials. Determination of physical and mechanical properties of construction materials. Theory and design of compression and flexural members. Emphasis on ultimate strength theory for concrete. Timber design using mechanical fasteners. Laboratory exercises include concrete aggregate evaluation, concrete mix design, and structural timber tests. (1.0 ED) Prerequisite: Civil Engineering 131. One course. *Biswas*

134. Structural Design II. Design in metals, primarily steel. Properties of materials as criteria for failure. Tension, compression, and flexural members. Bolted and welded connections, including eccentric connections. Built-up members. Design by elastic and plastic methods. Selected problems to include computations and drawings. (1.0 ED) Prerequisite: Civil Engineering 131. One course. *Biswas or Melosh*

139. Introduction to Soil Mechanics. Origin and composition of soils, soil structure. Flow of water through soils; capillary and osmotic phenomena. Soil behavior under stress; compressibility, shear strength. Elements of mechanics of soil masses with application to problems of bearing capacity of foundations, earth pressure on retaining walls, and stability of slopes. Laboratory included. (.5 ED/.5 ES) Prerequisite: Civil Engineering 122. One course. *Hueckel*

141, 142. Special Topics in Civil Engineering. Study arranged on a special topic in which the instructor has particular interest and competence. Half course or one course each. Prerequisites: consent of instructor and Director of Undergraduate Studies. Variable credit. *Staff*

197, 198. Projects in Civil Engineering. These courses may be taken by junior and senior engineering students who have demonstrated aptitude for independent work. Half course or one course each. Prerequisites: consent of instructor and Director of Undergraduate Studies. Variable credit. *Staff*

201. Advanced Mechanics of Solids. Tensor fields and index notation. Analysis of states of stress and strain. Conservation laws and field equations. Constitutive equations for elastic, viscoelastic, and elastic-plastic solids. Formulation and solution of simple problems in elasticity, viscoelasticity, and plasticity. (1.0 ES) One course. *Hueckel or Petroski*

203. Plasticity. Inelastic behavior of soils and engineering materials. Yield criteria. Flow rules. Concepts of perfect plasticity and plastic hardening. Methods of rigid-plasticity. Limit analysis. Isotropic and kinematic hardening. Plastic softening. Diffused damage. Thermo-plasticity. Visco-plasticity. (1.0 ES) Prerequisite: Civil Engineering 201 or consent of instructor. One course. *Hueckel*

204. Plates and Shells. Differential equation and extremum formulations of linear equilibrium problems of Kirchhoffian and non-Kirchhoffian plates of isotropic and orthotropic material. Solution methods. Differential equation formulation of thin shell problems in curvilinear coordinates; membrane and bending theories; specialization for shallow shells, shells of revolution, and plates. Extremum formulation of shell problems. Solution methods. (1.0 ES) Prerequisites: Mathematics 111 and Engineering 75 or 135. One course. *Utku*

205. Elasticity. Introduction to linear theory of elasticity. Constitutive equations for anisotropic and isotropic elastic solids. Formulation and solution of torsion, bending, and flexure problems. Plane, axisymmetric, and three-dimensional problems. (1.0 ES) One course. *Petroski*

207. Transport Phenomena in Biological Systems. (.25 ED/.75 ES) See C-L: Biomedical Engineering 207; also C-L: Mechanical Engineering 207. One course. *Bryers, Daniels, or Hochmuth*

210. Intermediate Dynamics. Comprehensive treatment of space kinematics, kinetics of particles and rigid bodies; generalized coordinates and Lagrange's equations; introduction to stability, nonlinear, and random dynamic analysis of flexible, continuous systems. (.25 ED/.75 ES) C-L: Mechanical Engineering 210. One course. *Dowell*

212. Mechanical Behavior of Materials. Historical perspective on structural failure. Fracture mechanics and its application to brittle and ductile fracture, and fatigue in structural materials. Analysis of load spectra; fatigue crack growth calculations. (.25 ED/.75 ES) One course. *Petroski*

215. Engineering Systems Analysis. Fundamental concepts and tools for engineering systems analysis, including optimization techniques and decision analysis. System definition and model formulation, optimization by calculus, linear programming, integer programming, separable integer programming, nonlinear programming, network analysis, dynamic programming, and decision analysis. Application to diverse engineering systems. (.25 ED/.75 ES) Prerequisite: senior standing. One course. *Pas*

216. Transportation Planning and Policy Analysis. Issues in policy planning and decision making in urban and rural transportation systems. Transportation legislation. Public transportation alternatives with emphasis on public transit and paratransit solutions. (1.0 ES) Corequisite: Civil Engineering 116 or consent of instructor. C-L: Public Policy Studies 254. One course. *Pas*

217. Transportation Systems Analysis. The transportation systems planning process. Quantitative analysis; mathematical modeling and computer simulation techniques for short- and long-range planning and evaluation of transportation systems. (1.0 ES) Corequisite: Civil Engineering 116. One course. *Pas*

218. Engineering Management and Project Evaluation. Statistical analysis and economics. Data organization, distributions, estimates of parameters, hypothesis testing, analysis of variance. Economic impact assessment, supply and demand forecasting, benefit/cost analysis, economic incentives, public and private finance, input/output analysis. (1.0 ES) Prerequisite: senior standing in engineering. One course. *Peirce*

225. Dynamic Engineering Hydrology. Dynamics of the occurrence, circulation, and distribution of water; hydrometeorology, geophysical fluid motions. Precipitation, surface runoff and stream flow, infiltration, water losses. Hydrograph analysis, catchment characteristics, hydrologic instrumentation, and computer simulation models. (1.0 ES) Prerequisite: Civil Engineering 122. One course. *Medina*

227. Groundwater Hydrology and Contaminant Transport. Review of surface hydrology and its interaction with groundwater. The nature of porous media, hydraulic conductivity, and permeability. General hydrodynamic equations of flow in isotropic and anisotropic media. Water quality standards and contaminant transport processes: advective-dispersive equation for solute transport in saturated porous media. Analytical and numerical methods, selected computer applications. Deterministic versus stochastic models. Applications: leachate from sanitary landfills, industrial lagoons and ponds, subsurface wastewater injection, monitoring of groundwater contamination. Conjunctive surface-subsurface models. (.1 ED/.9 ES) Prerequisite: Civil Engineering 123. One course. *Medina*

232. Reinforced Concrete Design. A critical review of research related to the development of existing codes. Special attention is given to the consideration of temperature change effects, shrinkage, plastic flow, bond, and shear and diagonal tension. Two-way slab and flat plate design. (1.0 ED) Prerequisite: Civil Engineering 133. One course. *Biswas*

233. Prestressed Concrete Design. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams, and columns; partial prestressing and composite design. (1.0 ED) Prerequisite: Civil Engineering 133. One course. *Biswas*

234. Advanced Structural Design in Metals. Design of metal structures using limit-state theory. Critical review of the basis for Load and Resistance Factor Design (LRFD) specifications. Application to bridge, building, offshore, and aerospace structures. Evaluation of contemporary structural systems for planning and preliminary design. (1.0 ED) Prerequisite: Civil Engineering 134. One course. *Biswas*

235. Foundation Engineering. An introduction to methods of analysis, design, and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration, excavation and bracing, drainage and stabilization, and underpinning. Foundation vibrations. (1.0 ED) Prerequisite: Civil Engineering 139. One course. *Hueckel*

237. Advanced Soil Mechanics. Characterization of behavior of geomaterials. Stress-strain incremental laws. Non-linear elasticity, hypo-elasticity, plasticity and viscoplasticity of geomaterials. Approximated laws of soil mechanics. Fluid-saturated soil behavior. Cyclic behavior of soils. Liquefaction and cyclic mobility. Elements of soil dynamics. Thermal effects on soils. (1.0 ES) Prerequisite: Civil Engineering 139 or equivalent. One course. *Hueckel*

241. Aquatic Chemistry. Chemical processes in the natural water environment. Quantitative treatment of the variables which determine the composition of natural

waters. Emphasis on chemical behavior of natural aquatic systems including lakes, ocean waters, rivers, estuaries, groundwaters, and water treatment systems. (.1 ED/.9 ES) One course. *Bryers*

243. Physicochemical Unit Operations in Water Treatment. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and biotreatment processes. (.25 ED/.75 ES) Prerequisite: Engineering 24 or Civil Engineering 124. One course. *Bryers or Vesilind*

244. Biological Waste Treatment. Existing and novel biological processes used to treat or exploit waste. Concepts of microbiology, chemical engineering, and process analysis. Specific biological processes such as aerobic carbon oxidation, nitrification, denitrification, methane production, biological electricity generation, aerobic digestion, and waste water treatment for long term space travel. (.25 ED/.75 ES) One course. *Bryers*

245. Pollutant Transport Systems. Distribution of pollutants in natural waters and the atmosphere; diffusive and advective transport phenomena within the natural environment and through artificial conduits and storage/treatment systems. Analytical and numerical prediction methods. (.1 ED/.9 ES) Prerequisites: Civil Engineering 122 and Mathematics 111. One course. *Medina*

246. Water Supply Engineering Design. The study of water resources and municipal water requirements including reservoirs, transmission, treatment and distribution systems; methods of collection, treatment, and disposal of municipal and industrial wastewaters. The course includes the preparation of a comprehensive engineering report encompassing all aspects of municipal water and wastewater systems. Field trips to be arranged. (.8 ED/.2 ES) Prerequisite: Engineering 24 or Civil Engineering 124. One course. *Vesilind*

248. Solid Waste and Resource Recovery Engineering. Engineering design of resource recovery systems including traditional and advanced technologies. Sanitary landfills and incineration of solid wastes. Energy recovery and recycling processes. Application of systems analysis to collection of municipal refuse. Collection, treatment, and disposal of solid wastes from wastewater treatment. (1.0 ED) Prerequisite: Engineering 24 or Civil Engineering 124. One course. *Vesilind*

249. Control of Hazardous and Toxic Waste. Solutions to industrial and municipal hazardous waste management problems. Handling, transportation, processing, storage, and disposal technologies. Upgrading an abandoned disposal site. Economic and regulatory aspects. Case studies. (.25 ED/.75 ES) Prerequisites: senior standing in engineering or natural sciences and consent of instructor. One course. *Peirce*

251. Systematic Engineering Analysis. Mathematical formulation and numerical analysis of discrete engineering systems with emphasis on theory of structures. Equilibrium and propagation problems in continuum; properties of these systems and their discretization by the trial functions with undetermined parameters. The use of weighted residual methods, finite elements, and finite differences. (1.0 ES) One course. *S. Utku*

254. Applications of Finite Element Analysis. Theory of element and material models; models of metals, rock, reinforced concrete, wood, glass, soil, water, and air; analyses of torsion members, shear walls, membranes, plates, shells, solids, and compound structural systems; analysis of soil-structure and fluid-structure systems; prediction of field heating, seepage, and pollution. (.1 ED/.9 ES) Prerequisite: Civil Engineering 251. One course. *Melosh*

257. Structural Optimization. Computer-aided improvement of structural designs; redesign search processes, sensitivity analysis, integrity analysis; optimization of static, steady-state, and transient response systems; minimization of structural weight and response potentials for trusses, frames, and continua. (.65 ED/.35 ES) One course. *Melosh*

258. Analysis of Dynamic and Nonlinear Behavior of Structures. Computation of nonlinear response by discretization; models for simulation of geometric, material, and boundary constraint nonlinearities; analysis of limit loads, bifurcations, and snap-through; simulation of super-elastic, plastic, visco-elastic, and slipping materials; prediction of collapsing, ballooning, gapping, metal forming, and welding behavior. (1.0 ES) Prerequisite: Civil Engineering 251. One course. *Melosh or S. Utku*

265. Advanced Topics in Civil Engineering. Opportunity for study of advanced subjects relating to programs within the civil engineering department tailored to fit the requirements of a small group. One course. *Staff*

280. Engineering Aspects of Physical Oceanography. Study of the dynamic ocean processes of concern to the design engineer. Hydrometeorology, surface wind distributions, mechanics of generation and propagation of surface water waves, theory of periodic waves (linear and nonlinear), wave spectral descriptive models, astronomical tides, storm surge, impulsively generated waves (tsunamis), and wind- and wave-induced forces on various obstructions. Attention is focused on hindcasting-forecasting techniques and selection of design (wave spectra) criteria in terms of specified risk levels. (.5 ED/.5 ES) Prerequisite: senior or graduate standing in engineering or the physical sciences. One course. *Staff*

281. Experimental Systems. Formulation of experiments; Pi theorem and principles of similitude; data acquisition systems; static and dynamic measurement of displacement, force, and strain; interfacing experiments with digital computers for statistical data analysis. Students select, design, perform, and interpret laboratory-scale experiments in areas of fluid systems including environmental and ocean engineering, and in solid systems including structural and basic material behavior. (.3 ED/.7 ES) Prerequisite: senior or graduate standing in engineering or the physical sciences. One course. *J. F. Wilson*

282. Port, Harbor, and Coastal Engineering. An intensive study of the various types of marine and coastal structures and their functions. Procedures for developing preliminary design alternatives and final design selection will be illustrated via the case history approach. Structures to be considered include piers (solid and open faced), seawalls and bulkheads, breakwaters, jetties, groins, outfalls, pipelines, moored cable array systems, and floating terminals. Each case history will be followed from conception and initial planning through the design stage to construction and post project evaluation. Normally, there will be an opportunity to participate in an ongoing project. (1.0 ED) Prerequisite: Civil Engineering 280. One course. *Staff*

283. Structural Dynamics. Formulation of dynamic models for discrete and continuous structures, normal mode analysis, deterministic and stochastic responses to shocks and environmental loading (earthquakes, winds, and waves), introduction to nonlinear dynamic systems, analysis and stability of structural components (beams and cables and large systems such as offshore towers, moored ships, and floating platforms). (1.0 ES) One course. *J. F. Wilson*

COURSES CURRENTLY UNSCHEDULED

202. Advanced Mechanics of Solids II

226. Operational Hydrology

236. Earth Structures

238. Rock Mechanics

239. Physical Properties of Soils

247. Air Pollution Control

THE MAJOR

The major requirements are included in the minimum total of thirty-four courses listed under the general requirements and departmental requirements.

Electrical Engineering (EE)

Professor Casey, *Chairman*; Associate Professor Hacker, *Director of Undergraduate Studies*; Professors Fair, Joines, Kerr, Marinos, Nolte, Pilkington, Trivedi, Wang, and T. G. Wilson; Associate Professor Massoud; Assistant Professors Alexandrou, Board, Carroll, Dolas, Dugan, and George; Professor Emeritus Owen; Research Assistant Professor Frenzel; Adjunct Professors Glomb and Strosio; Adjunct Associate Professor Rebman; Adjunct Assistant Professors Derby, Goodwin-Johansson, Kanopoulos, and Strole; Visiting Professor Trickey; Visiting Assistant Professor Loeb

A major is available in this department.

Electrical engineering is a broadly based discipline dealing with the processing, control, and transmission of information and energy by making use of electrical and electromagnetic phenomena.

The flexibility of the electrical engineering curriculum permits students to concentrate in such areas as computer engineering and digital systems, control systems, electronic circuits and microelectronics, signal processing and communications, and electromagnetic fields and microwaves. Students may also plan a double-major program with secondary concentration in such fields as computer science, biomedical engineering, physics, mathematics, history, public policy studies, and many others. Students with interests such as premedicine, prelaw, economics, art, music, psychology, and social systems can be accommodated within the curriculum through individually designed programs.

The various teaching and research laboratories in the department provide opportunities for laboratory and project work in areas such as electronics, digital systems, microelectronics and microprocessors, signal analysis and adaptive signal processing, power electronics, microwaves and microwave-matter interactions, and solid-state properties of materials. These laboratories are important to the undergraduate program since they permit students to become actively acquainted with the devices and techniques of modern electrical engineering through regularly scheduled experiments, independent projects, and occasionally, part-time assistance to faculty members engaged in research.

51, 52. Undergraduate Research in Electrical Engineering. An elective program in which undergraduate students participate in an ongoing program of research with electrical engineering faculty members. The research topic to be pursued by the student must be discussed with, and approved by, the faculty member who is to serve as the research supervisor prior to registration for the course. For sophomores only. Quarter course each. *Staff*

61. Introductory Circuits and Systems. Circuit principles for linear and nonlinear networks, common signal waveforms, natural and forced response of linear circuits. Circuits in the AC steady state. One-port and two-port network theorems, transfer functions, block diagrams, feedback. Semiconductor diodes, transistors, and integrated circuits. (.25 ED/.75 ES) Prerequisites: Mathematics 32 and Physics 51. One course. *Staff*

62. Introductory Electronics and Energy Conversion. Amplifiers: biasing circuits, large-signal diode and transistor models, small-signal multistage and feedback amplifiers. Operational amplifiers and analog computers. Energy conversion via magnetic fields and circuits. Transformers, DC and AC machines, instrumentation, and automatic control. (.25 ED/.75 ES) Prerequisite: Electrical Engineering 61. One course. *Staff*

101, 102. Undergraduate Research in Electrical Engineering. For juniors only. See Electrical Engineering 51, 52. Quarter course or half course each. Variable credit. *Staff*

103. Introduction to Nonlinear Network Theory. Introduction to theory and techniques for analysis and synthesis of nonlinear circuits. Characterization of 2-, 3-, and n-terminal nonlinear network elements. Laws for interconnecting elements and determining equilibrium equations. Operating points, driving-point and transfer-characteristic plots. Graphical and numerical analysis and synthesis of DC and AC nonlinear resistive functional networks. Nonautonomous first-order nonlinear networks, and autonomous second-order nonlinear networks. Some laboratory and computer simulations. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 61. One course. *T. G. Wilson*

112. Fundamentals of Linear System Theory. Fourier series and transforms; spectral analysis applied to networks and modulation systems. Laplace transforms and transient response of systems; transfer functions, poles and zeros, stability. Introduction to Z-transforms and state variable models. (1.0 ES) Prerequisite: Electrical Engineering 61. One course. *Staff*

132. Statistical and Computational Methods in Signal Processing. Introduction to fundamental concepts of signal processing for both deterministic and random discrete-time signals in noise. Difference equations, sampling theorem, Z-transforms, and spectral analysis. Detection and estimation of signals in noise. Some computer simulations. (.5 ED/.5 ES) Prerequisites: Biomedical Engineering 171 or Electrical Engineering 112 and Mathematics 135 or equivalent. C-L: Biomedical Engineering 132. One course. *Nolte*

142. Thermodynamics of Electrical Processes. A study of those aspects of classical and statistical thermodynamics that are essential for an understanding of the thermal properties of electrical materials and processes. Emphasis will be placed on the thermodynamics of metals, semiconductors, and superconductors. (1.0 ES) Prerequisites: Electrical Engineering 112 and Mathematics 104 or 111. One course. *Hacker*

143. Introduction to Electromagnetic Fields. Review of vector analysis. Introduction to Maxwell's equations. Electrostatic and magnetostatic fields and their sources. Electromagnetic power, energy, and the Poynting theorem. (.25 ED/.75 ES) Prerequisites: Mathematics 104 or 111 and Physics 52. One course. *Hacker or Joines*

151, 152. Undergraduate Research in Electrical Engineering. For seniors only. See Electrical Engineering 51, 52. Quarter course or half course each. Variable credit. *Staff*

155, 156. Special Topics in Electrical Engineering. Study of selected topics in electrical engineering tailored to fit the requirements of a small group. Half course or one course each. Prerequisites: consent of instructor and Director of Undergraduate Studies. Variable credit. *Staff*

157. Introduction to Switching and Automata Theory. This course introduces techniques for the analysis and design of combinational and sequential networks. Discrete mathematical systems, elements of code theory, threshold logic, functional decomposition, minimum-complexity combinational and sequential networks, asynchronous and clocked sequential systems, iterative switching structures, Turing machines, fault diagnosis techniques. Selected laboratory work. Usually open to juniors and seniors. (.25 ED/.75 ES) C-L: Computer Science 157. One course. *Carroll or Strole*

160. Digital Electronics and Computer Hardware. An introductory course in digital electronics. Topics include the basics of DC and AC circuit analysis, digital circuitry, MOS devices and hybrid designs, timing considerations. Switching characteristics of transistors, simple amplifier circuits. Speed, power, fanin and fanout, and cost as a basis for comparison of different logic families. Applications to digital system design. Not open to electrical or biomedical engineering majors, or to anyone who has taken Electrical

Engineering 61. (.25 ED/.75 ES) Prerequisites: Physics 52 and Electrical Engineering 157 or equivalent. One course. *Dollas or Dugan*

161. Electronic Circuits. Graphical and mathematical modeling of electronic devices such as diodes, and bipolar-junction and field-effect transistors; techniques for the analysis and design of electronic circuits with emphasis on large-signal and small-signal methods; applications of these methods to particular circuits, including regulators, bias-point stability, amplifiers, and switching circuits; computer simulation of electronic circuits using SPICE. Three class sessions and one computation or laboratory session. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 112. One course. *George*

162. Advanced Analog Electronic Circuits. Feedback and operational amplifiers: a study of feedback analysis, stability design, circuits; bipolar junction transistor and MOS operational amplifier analyses, stability techniques, noise, and other topics. Laboratory and computer simulation work. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 161. One course. *Derby and George*

173, 174. Projects in Electrical Engineering. A course which may be undertaken only by seniors who are enrolled in the graduation with distinction program or who show special aptitude for individual project work. Elective for electrical engineering majors. Half course to two courses each. Prerequisite: consent of Director of Undergraduate Studies. Variable credit. *Staff*

186. Introduction to Electronic Communications. Spectral analysis and sampling of analog signals. Noise sources, narrow-band noise models, noise temperature of antennas and amplifiers. Information capacity of noisy channels. Compact codes; error detecting and correcting codes. AM, FM, pulse, and digital modulation and detection systems. Pulse code detection and matched filters. Examples from commercial broadcasting and television, Bell T-carrier, deep-space telemetry, and optical fiber communications. (.25 ED/.75 ES) Prerequisites: Electrical Engineering 62 and 112 or equivalents. One course. *Kerr or Nolte*

187. Digital Telecommunications. Examination of existing telephone networks in the U.S. with emphasis on the transition from analog to digital systems. Sequential processes of encoding, transmission, switching, and network hierarchy. Consideration of the problems which must be solved in the transition from analog to digital networks. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 186. One course. *Glomb*

199. Linear Control Systems. Analysis and design of feedback control systems. Block diagram and signal flow graph system models. Servomechanism characteristics, steady state errors, sensitivity to parameter variations and disturbance signals. Time domain performance specifications. Stability. Root locus, Nyquist, and Bode analysis; design of compensation circuits; closed loop frequency response determination. Introduction to time domain analysis and design. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 112 or consent of instructor. One course. *Kerr or T. G. Wilson*

202. Digital Communication Systems. Transmission of pulse signals over analog channels at baseband and high frequency. Effects of channel amplitude and phase distortion, multipath, and noise. Typical signaling formats and their autocorrelation functions and power spectra. Theory and design of adaptive transversal filters for the elimination of intersymbol interference. Design of digital transversal matched filters to reduce error probabilities in the presence of noise. Optimum pulse shaping techniques and Nyquist channel characteristics. Discrete Fourier transforms, FFTs, and their relation to continuous Fourier transforms. Introduction to the channel characteristics and sources of noise in optical fiber channels. (.5 ED/.5 ES) Prerequisites: Electrical Engineering 186 and Mathematics 135 or Electrical Engineering 203, or consent of instructor. One course. *Kerr*

203. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation. (1.0 ES) One course. *Kerr or Nolte*

204. Computer Network Architecture. The architecture of computer communication networks and the hardware and software required to implement the protocols that define the architecture. Basic communication theory, transmission technology, private and common carrier facilities. International standards. Satellite communications and local area networks. Performance analysis and modeling of communication networks. (.25 ED/.75 ES) Prerequisite: Electrical Engineering 157. C-L: Computer Science 204. One course. *Strole*

205. Signal Detection and Extraction Theory. Introduction to signal detection and information extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection, and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, and decision processes with finite memory. Applications to problems in communication theory. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 203 or consent of instructor. One course. *Nolte*

206. Digital Signal Processing. Introduction to the fundamentals of processing signals by digital techniques with applications to practical problems. Discrete time signals and systems, elements of the Z-transform, discrete Fourier transforms, digital filter design techniques, fast Fourier transforms, and discrete random signals. (.5 ED/.5 ES) One course. *Nolte*

207. Fault-Tolerant and Testable Computer Systems. Faults and failure mechanisms, test generation techniques and diagnostic program development for detection and location of faults in digital networks; design for testability, redundancy techniques, self-checking and fail-safe networks, fault-tolerant computer architectures. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 157 or equivalent. C-L: Computer Science 207. One course. *Marinos*

208. Digital Computer Design. Structural organization and hardware design of digital computer systems. Arithmetic unit, switching matrices, memory organization, central processing unit (CPU), I/O unit, and microprogram control. Detailed design and simulation of a general-purpose computer system. Computer systems based on cellular structures, hardware compilers, and parallel processing architectures are also discussed. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 157 or consent of instructor. C-L: Computer Science 208. One course. *Marinos*

209. Microprocessor Fundamentals and Applications. Various state-of-the-art microprocessor chips and their associated instruction sets; microcomputer architectures; comparative study of various microprocessor designs; microprocessor-based system design illustrated by several carefully selected design projects. (.5 ED/.5 ES) Prerequisites: Electrical Engineering 157 and consent of instructor. C-L: Computer Science 209. One course. *Carroll or George*

210. Introduction to VLSI Systems. A study of devices, circuits, fabrication technology, logic design techniques, and system architecture intended to provide the student with an understanding of the underlying physics and design techniques of VLSI systems. Students are required to complete the design of a digital subsystem in NMOS. (.5 ED/.5 ES) Prerequisites: Electrical Engineering 157 and 216 or consent of instructor. One course. *Carroll*

211. Quantum Mechanics. Wave mechanics and elementary applications, free particle motion, Schrödinger equation, approximation methods. (1.0 ES) One course. *Staff*

213. Modern Optics. Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications of these concepts to lasers and modern optical devices. (.25 ED/.75 ES) C-L: Physics 185. One course. *Guenther or Hacker*

214. Introduction to Solid-State Physics. Discussion of solid-state phenomena including crystalline structures, thermal properties, free electron theory of metals, and band theory of semiconductors with emphasis on understanding the electrical, magnetic, and optical properties of solids. (.25 ED/.75 ES) C-L: Physics 214. One course. *Hacker*

216. Devices for Integrated Circuits. Basic operating concepts of the devices that are used in integrated circuits: Schottky-barriers, ohmic contacts, p-n junctions, bipolar transistors, and Si MOS capacitors and field-effect transistors. Basic MOS logic circuits. Selected laboratory work. (.25 ED/.75 ES) One course. *Casey*

218. Integrated Circuit Engineering. Basic processing techniques and layout technology for integrated circuits. Photolithography, diffusion, oxidation, ion implantation, and metallization. Design, fabrication, and testing of integrated circuits. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 216. One course. *Casey or Fair*

219. Digital Integrated Circuits. Analysis and design of digital integrated circuits. MOSFET and bipolar devices. SPICE models. Major logic families such as NMOS, CMOS, TTL, ECL, and I²L as well as regenerative logic circuits and memories. Circuit design considerations for LSI and VLSI. (.5 ED/.5 ES) Prerequisites: Electrical Engineering 157 and 216. One course. *Massoud*

225. Microwave Electronic Circuits. Microwave circuit analysis and design techniques. Properties of planar transmission lines for integrated circuits. Matrix and computer-aided methods for analysis and design of circuit components. Analysis and design of input, output, and interstage networks for microwave transistor amplifiers and oscillators. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 161 or equivalent. One course. *Joines*

234. Power Electronics: High-Power Circuits. Basic principles of analysis and design of electronic power control and conversion circuits with particular emphasis on thyristor (SCRs, TRIACs, etc.) circuits. Characteristics of high-power semiconductors, commutating circuits, AC voltage controllers, AC-to-AC controlled rectifiers, DC-to-DC converters, DC-to-AC inverters, AC-to-AC converters. Laboratory. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 161 or equivalent. One course. *T. G. Wilson*

235. Nonlinear Magnetic and Semiconductor Power Converters. Nonlinear magnetic and semiconductor switching characteristics for transient and steady-state analysis of power electronic circuits. Design of saturable and nonsaturating magnetic devices. State-plane analysis of negative-resistance oscillators and self-oscillating inverters. Laboratory. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 161 or equivalent. One course. *T. G. Wilson*

236. Energy-Storage Power Converters. Analysis and design of switch-mode electronic power converters utilizing energy-storage principles. Determination of large-signal and small-signal dynamic response and stability of closed-loop regulated converters. Extensive use of computer-aided analysis, design and measurement techniques. Laboratory. (.75 ED/.25 ES) Prerequisite: Electrical Engineering 161 or equivalent. One course. *T. G. Wilson*

241. Linear Systems. Modeling of multiple input-output linear systems in the frequency and time domain. Matrix differential and difference equations and their solu-

tions; state variables. Digital simulation of differential systems. Fourier analysis of signals and systems. Transform techniques applied to state variable models. State-space models of distributed systems. (.25 ED/.75 ES) One course. *Kerr or Wang*

250. Introduction to Robotics. Fundamental notions in robotics, basic configurations of manipulator arm designs, coordinate transformations, control of robot actions, robot programming, artificial intelligence; machine vision, force, touch, and other sensory systems; selected laboratory assignments. (.25 ED/.75 ES) Prerequisites: Electrical Engineering 112 and consent of instructor. One course. *Wang*

251. Pattern Classification and Recognition. Parameter estimation and supervised learning, nonparametric techniques, linear discriminant functions, clustering, language theory related to pattern recognition, examples from areas such as character and severe weather recognition, classification of community health data, recognition of geometrical configurations, algorithms for recognizing low resolution touch-sensor array signatures and 3-D objects. (.5 ED/.5 ES) Prerequisite: consent of instructor. One course. *Wang*

252. Computer Systems Organization. See C-L: Computer Science 252. One course. *Patrick or Trivedi*

265. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the electrical engineering department tailored to fit the requirements of a small group. Prerequisites: approval of Director of Undergraduate Studies and of supervising instructor. One course. *Staff*

271. Electromagnetic Theory. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, and force and energy relations. Three class sessions. (.25 ED/.75 ES) Prerequisite: consent of instructor. One course. *Hacker or Joines*

272. Electromagnetic Communication Systems. Review of fundamental laws of Maxwell, Gauss, Ampere, and Faraday. Elements of waveguide propagation and antenna radiation. Analysis of antenna arrays by images. Determination of gain, loss, and noise temperature parameters for terrestrial and satellite electromagnetic communication systems. (.5 ED/.5 ES) Prerequisite: Electrical Engineering 164 or 271. One course. *Joines*

273. Optical Communication Systems. Mathematical methods, physical ideas, and device concepts of optoelectronics. Maxwell's equations, and definitions of energy density and power flow. Transmission and reflection of plane waves at interfaces. Optical resonators, waveguides, fibers, and detectors are also presented. (.25 ED/.75 ES) Prerequisite: Electrical Engineering 143 or equivalent. One course. *Joines*

COURSES CURRENTLY UNSCHEDULED

185. Pulse and Digital Electronics

188. Electrical Energy Systems

215. Semiconductor Physics

217. Lasers

222. Nonlinear Analysis

224. Advanced Electronic Circuits

226. Modeling and Computer-Aided Analysis of Electronic Systems

227. Network Synthesis

243. Advanced Linear Systems Theory

THE MAJOR

The major requirements are included in the minimum total of 34 courses listed under the general requirements and departmental requirements. The electrical engineering department requires the equivalent of 4.25 engineering design and 8.50 engineering science courses.

Mechanical Engineering and Materials Science (ME)

Professor Hochmuth, *Chairman*; Assistant Professor Buzzard, *Director of Undergraduate Studies*; Professors Bejan, Chaddock, Cocks, Dowell, Garg, Gösele, Harman, Pearsall, Shaughnessy, Shepard, and Tan; Associate Professors Bliss, Jones, Quinlan, and Wright; Assistant Professors Cherry, Georgiadis, Knight, and Needham; Research Assistant Professors Pezeshki and Tran-Son-Tay; Adjunct Assistant Professor Lind

A major is available in this department.

The profession of mechanical engineering began during the industrial revolution when mankind learned how to use the energy contained in coal and oil to perform useful work. The early mechanical engineers designed the machine tools and the shafts, pulleys, gears, cams, pistons, cylinders, crankshafts, boilers, turbines, and generators for transportation and manufacturing in the eighteenth and nineteenth centuries. These early engineers also discovered a new branch of physics, called thermodynamics, which puts a definite limit on just how much energy can be converted into useful work. Thus, even at its beginning, mechanical engineering involved both science and the art of design.

Modern mechanical engineering contains all of its historical elements plus microprocessors and computers to aid in design and analysis and to create "smart" machines and robots. Also, in a world of expanding population and shrinking natural resources, modern mechanical engineers must strive to minimize any adverse impacts of their machines and power plants on the environment by minimizing the consumption of energy and the production of pollutants. Finally, they must be able to analyze failures and eliminate them through rational design and selection of materials.

The rapid change of our technological society requires that engineering students learn to think in a fundamental way so they can grow, develop, and adapt throughout life. To accomplish this, students of mechanical engineering first study the "basics": mathematics, including advanced applied mathematics; physics, including classical mechanics, dynamics, and electromagnetics; chemistry; the humanities; and the social sciences. Courses in the mechanical engineering sciences serve as a connecting link between the basic subjects and design. These engineering sciences include thermodynamics, kinematics, solid and fluid mechanics, heat transfer, and materials science. In order to learn how to acquire and process information and create smart machines, students also take courses in electronics, instrumentation and measurements, and modeling and control of dynamic systems. Finally, students use their knowledge in advanced courses in design. Students may take as electives advanced 200-level courses in thermodynamics, fluid mechanics, lubrication, heat transfer, acoustics, dynamics and control, biochemical engineering, corrosion, electronic materials, polymer science, physical metallurgy, and expert systems. The department has a number of research and teaching laboratories in these areas of study.

Students wishing to meet the requirements for graduation with distinction in mechanical engineering and materials science must satisfy the requirements specified in this bulletin under the section on honors. Additionally, the student must successfully complete a 200-level course in an area related generally to the central focus of the project. The 200-level course may be taken prior to, concurrent with, or subsequent to the work of the special project.

11, 12. Undergraduate Research in Mechanical Engineering. An elective program in which undergraduate students participate in an ongoing program of research with

mechanical engineering faculty members. The research topic pursued by the student is arranged by mutual agreement between the student and the participating faculty member. For freshmen only. Quarter course each. *Staff*

102. Thermodynamics II. Application of the laws of thermodynamics to gas and vapor cycles. Compressor, turbine, and internal combustion engine design and performance. Refrigeration systems and analysis and applications in air conditioning. Aircraft propulsion system performance. Thermodynamics of direct energy conversion devices. (.6 ED/.4 ES) Prerequisite: Engineering 101. One course. *Harman*

113. Introduction to Electronic Materials. The fundamental relationships between structure and the electronic properties of materials. Emphasis on the interrelationship of solid state chemistry and the control and prediction of concomitant electronic properties. Materials preparation and characterization methods. (.25 ED/.75 ES) Prerequisite: Engineering 83. One course. *Cocks, Gösele, or Tan*

115. Failure Analysis and Prevention. A study and analysis of the causes of failure in engineering materials and the diagnosis of those causes. Elimination of failures through proper material selection, treatment, and use. Case histories. Examination of fracture surfaces. Laboratory investigations of different failure mechanisms. (.5 ED/.5 ES) Prerequisites: Engineering 75 and 83 or consent of instructor. One course. *Jones, Cocks, Pearsall, or Shepard*

120. Engineering Instrumentation and Measurements. Analysis, design, and application of instrumentation. Error analysis and propagation. Experimental laboratory with PCXT based measurement and data acquisition, analysis, and graphic display. (.25 ED/.75 ES) Corequisite: Engineering 130. One course. *Buzzard*

126. Fluid Mechanics. An introductory course emphasizing the application of the principles of conservation of mass, momentum, and energy to a fluid system. Physical properties of fluids, dimensional analysis and similitude, viscous effects and integral boundary layer theory, subsonic and supersonic flows, normal shock waves. Selected laboratory work. (.25 ED/.75 ES) Corequisite: Engineering 101 and 123. One course. *Buzzard, Hochmuth, Shaughnessy, or Tran-Son-Tay*

141. Mechanical Design. A study of practical aspects of mechanical design including conceptualization, specifications, and selection of mechanical elements. The design and application of mechanical components such as gears, cams, bearings, springs, and shafts. Practice in application of the design process through design projects. (1.0 ED) Prerequisite: Mechanical Engineering 115. One course. *Knight or Wright*

150. Heat and Mass Transfer. A rigorous development of the laws of mass and energy transport as applied to a continuum. Energy transfer by conduction, in laminar and turbulent flow inside and outside of tubes, and by radiation. Application to heat exchangers, thermal power equipment, and heat transfer in the environment. Introduction to the principles of molecular diffusion and convective mass transfer. Use of the analogies between mass, momentum, and energy transfer in problem solving. Selected laboratory work. (.25 ED/.75 ES) Prerequisites: Mechanical Engineering 126 and Mathematics 111. One course. *Bejan, Buzzard, or Chaddock*

153. Heating, Air Conditioning, and Refrigeration. Principles of thermodynamics, heat transfer, and fluid flow applied to comfort and industrial air conditioning. Cycles and equipment for heating, cooling, and humidity control. Air transmission and distribution. Modern vapor compression, absorption, and low temperature refrigeration cycles and systems. (.8 ED/.2 ES) Prerequisite: Engineering 101. One course. *Staff*

160. Mechanical Systems Design. An integrative design course addressing both creative and practical aspects of the design of systems. Development of the creative design

process, including problem formulation and needs analysis, feasibility, legal, economic and human factors, aesthetics, safety, synthesis of alternatives, and design optimization. Application of design methods through several projects including a term design project. (1.0 ED) Prerequisites: Mechanical Engineering 141 and 150. One course. *Staff*

165, 166. Special Topics in Mechanical Engineering. Study arranged on a special engineering topic in which the faculty has particular interest and competence as a result of research and professional activities. (.25 ED/.75 ES) Half course or one course each. Prerequisites: consent of instructor and Director of Undergraduate Studies. Variable credit. *Staff*

183. Power Generation. Basic concepts of thermodynamics, heat transfer, and fluid flow applied to power generation processes. Nuclear reaction theory and reactor technology; fossil fuel combustion theory and modern boiler practice. Power plant ancillary equipment and processes. Design considerations and analyses include economic and environmental factors. (.6 ED/.4 ES) One course. *Harman*

198. Projects in Mechanical Engineering. This course may be assigned by the Chairman of the department to outstanding seniors who express a desire for such work and who have shown aptitude for research in one distinct field of mechanical engineering. (.75 ED/.25 ES) Half course to two courses. Prerequisites: B average and senior standing. Variable credit. *Staff*

202. Engineering Thermodynamics. General thermodynamic relationships and continuum properties of real substances. Availability and second law analysis of energy conversion processes. Low temperatures and the third law of thermodynamics. Reaction and multiphase equilibrium. Statistical thermodynamics of simple systems. (.3 ED/.7 ES) One course. *Bejan or Harman*

205. Biochemical Engineering. Mathematical analysis of the effects of substrate concentration, pH, temperature, and chemical inhibitors on the rate and yield of biological processes. Enzyme kinetics. Kinetics of cell growth and metabolite production in batch and continuous culture. Design of bioreactors for microbial, mammalian, and plant cell culture. (.25 ED/.75 ES) Prerequisites: calculus and a course in microbial physiology or biochemistry. One course. *Quinlan*

206. Optimization of Bioprocess Kinetics. Concepts and mathematical modeling techniques needed to maximize the rates and yields at which cells produce biomass and metabolites. (.25 ED/.75 ES) Prerequisite: Mechanical Engineering 205. One course. *Quinlan*

207. Transport Phenomena in Biological Systems. (.25 ED/.75 ES) See C-L: Biomedical Engineering 207; also C-L: Civil Engineering 207. One course. *Bryers, Daniels, or Hochmuth*

208. Introduction to Colloid and Surface Science. The colloid state: classification of colloids and the theoretical frameworks and experimental techniques involved in their characterization. Interfaces: surface tension and free energy; curved interfaces; adhesion, cohesion and wetting; surface activity; catalytic and mechanical properties of solid surfaces. Inter-Surface Forces: the balance of attractive and repulsive forces which operate between colloidal particles and at macroscopic surfaces. Some emphasis on natural and artificial biomembranes. (1.0 ES) Prerequisite: consent of instructor. One course. *Needham*

210. Intermediate Dynamics. Comprehensive treatment of space kinematics, kinetics of particles and rigid bodies; generalized coordinates and Lagrange's equations; introduction to stability, nonlinear, and random dynamic analysis of flexible, continuous systems. (.25 ED/.75 ES) C-L: Civil Engineering 210. One course. *Dowell*

211. Theoretical and Applied Polymer Science. An advanced course in materials science and engineering dealing specifically with the structure and properties of poly-

mers. Particular attention paid to recent developments in the processing and use of modern plastics and fibers. Product design considered in terms of polymer structures, processing techniques, and properties. (.6 ED/.4 ES) One course. *Clark or Pearsall*

212. Electronic Materials. An advanced course in materials science and engineering dealing with the various materials important for solid state electronics including semiconductors, ceramics, and polymers. Emphasis on thermodynamic concepts and on defects in these materials. Materials preparation and modification methods for technological applications. (.25 ED/.75 ES) Prerequisite: Engineering 83. One course. *Cocks, Gösele, or Tan*

214. Corrosion and Corrosion Control. Environmental aspects of the design and utilization of modern engineering alloys. Theory and mechanisms of corrosion, particularly in seawater and atmospheric environments. Microstructural aspects of diffusion, oxidation, hot corrosion, and stress corrosion. (.25 ED/.75 ES) Prerequisite: Engineering 83. One course. *Cocks or Jones*

215. Biomedical Materials and Artificial Organs. See C-L: Biomedical Engineering 215. One course. *Clark*

216. Materials Science and Solar Technology. All aspects of materials science as related to solar energy development. Emphasis is placed on photovoltaic materials and devices, including the relationship of conversion efficiency to material properties and solar cell design. (.5 ED/.5 ES) One course. *Cocks*

217. Fracture of Engineering Materials. Conventional design concepts and their relationship to the occurrence of fracture. Linear elastic and general yield fracture mechanics. Microscopic plastic deformation and crack propagation. The relationship between macroscopic and microscopic aspects of fracture. Time dependent fracture. Fracture of specific materials. (.7 ED/.3 ES) Prerequisites: Engineering 83 and Mechanical Engineering 115. One course. *Jones*

218. Thermodynamics of Electronic Materials. Basic thermodynamic concepts applied to solid state materials with emphasis on technologically relevant electronic materials such as silicon and GaAs. Thermodynamic functions, phase diagrams, solubilities and thermal equilibrium concentrations of point defects; nonequilibrium processes and the kinetic phenomena of diffusion, precipitation, and growth. (.25 ED/.75 ES) One course. *Cocks, Gösele, or Tan*

221. Compressible Fluid Flow. Basic concepts of the flow of gases from the subsonic to the hypersonic regime. Effects of friction, heat transfer, and shock on one-dimensional inviscid flow. Potential theory, oblique shock waves, and special calculation techniques in two-dimensional flow. (.4 ED/.6 ES) One course. *Harman or Shaughnessy*

224. An Introduction to Turbulence. Flow instability and the transition to turbulence. Physical characteristics of turbulent flows, averaging, and the Reynolds equation. Turbulent transport and mixing length theories. The statistical description of turbulence, correlations, and spectra. Fourier transforms. Measurement techniques. (1.0 ES) One course. *Shaughnessy*

226. Intermediate Fluid Mechanics. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorems. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. (.2 ED/.8 ES) One course. *Shaughnessy*

227. Advanced Fluid Mechanics. Flow of a uniform incompressible viscous fluid. Exact solutions to the Navier-Stokes equation. Similarity methods. Irrotational flow the-

ory and its applications. Elements of boundary layer theory. (.2 ED/.8 ES) Prerequisite: Mechanical Engineering 226 or consent of instructor. One course. *Shaughnessy*

229. Computational Fluid Mechanics and Heat Transfer. An exposition of numerical techniques commonly used for the solution of partial differential equations encountered in engineering physics. Finite-difference schemes (which are well-suited for fluid mechanics problems); notions of accuracy, conservation, consistency, stability, and convergence. Recent applications of weighted residuals methods (Galerkin), finite-element methods, and grid generation techniques. Through specific examples, the student is guided to construct and assess the performance of the numerical scheme selected for the particular type of transport equation (parabolic, elliptic, or hyperbolic). (.5 ED/.5 ES) One course. *Georgiadis*

230. Modern Control and Dynamic Systems. Dynamic modeling of complex linear and nonlinear physical systems involving the storage and transfer of matter and energy. Unified treatment of active and passive mechanical, electrical, and fluid systems. State-space formulation of physical systems. Time and frequency-domain representation. Controllability and observability concepts. System response using analytical and computational techniques. Lyapunov method for system stability. Modification of system characteristics using feedback control and compensation. Emphasis on application of techniques to physical systems. (.25 ED/.75 ES) One course. *Garg or Wright*

236. Engineering Acoustics. Fundamentals of acoustics including sound generation, propagation, reflection, absorption, and scattering. Emphasis on basic principles and analytical methods in the description of wave motion and the characterization of sound fields. Applications including topics from noise control, sound reproduction, architectural acoustics, and aerodynamic noise. Occasional classroom or laboratory demonstration. (.25 ED/.75 ES) Prerequisites: Mathematics 111 and Engineering 123 or consent of instructor. One course. *Bliss*

237. Aerodynamics. Fundamentals of aerodynamics applied to wings and bodies in subsonic and supersonic flow. Basic principles of fluid mechanics and analytical methods for aerodynamic analysis. Two- and three-dimensional wing theory, slender-body theory, lifting surface methods, vortex and wave drag. Brief introduction to vehicle design, performance, and dynamics. Special topics such as unsteady aerodynamics, vortex wake behavior, and propeller and rotor aerodynamics. (.25 ED/.75 ES) One course. *Bliss*

240. Patent Technology and Law for Engineers. The use of patents as a technological data base is emphasized including information retrieval in selected engineering disciplines. Fundamentals of patent law and patent office procedures. (.6 ED/.4 ES) One course. *Cocks*

245. Applications in Expert Systems. A comprehensive introduction to the key practical principles, techniques, and tools being used to implement knowledge-based systems. The classic MYCIN system studied in detail to provide historic perspective. Current systems employing combinations of production rules, prototypical knowledge, and frame-based case studies. Student term projects consisting of the development of individual, unique expert systems using the Texas Instruments Personal Consultant. Knowledge of LISP not a prerequisite. (.5 ED/.5 ES) One course. *Wright*

265. Advanced Topics in Mechanical Engineering. Opportunity for study of advanced subjects related to programs within mechanical engineering tailored to fit the requirements of a small group. (.25 ED/.75 ES) Prerequisite: approval of Director of Undergraduate or Graduate Studies. One course. *Staff*

270. Robot Control and Automation. Review of kinematics and dynamics of robotic devices; mechanical considerations in design of automated systems and processes, hydraulic and pneumatic control of components and circuits; stability analysis of robots

involving nonlinearities; robotic sensors and interfacing; flexible manufacturing; man-machine interaction and safety consideration. (.5 ED/.5 ES) Prerequisites: Mechanical Engineering 230 or equivalent and consent of instructor. One course. *Garg*

277. Optimization Methods for Mechanical Design. Definition of optimal design. Methodology of constructing quantitative mathematical models. Nonlinear programming methods for finding "best" combination of design variables: minimizing steps, gradient methods, flexible tolerance techniques for unconstrained and constrained problems. Emphasis on computer applications and term projects. (.5 ED/.5 ES) Prerequisite: consent of instructor. One course. *Wright*

COURSES CURRENTLY UNSCHEDULED

235. Advanced Mechanical Vibrations

THE MAJOR

The major requirements are included in the minimum total of thirty-four courses listed under the general requirements and departmental requirements. Specific courses which must be included are Engineering 75, 83, 101, 123, and 130; Mechanical Engineering 115, 120, 126, 141, 150, and 160.

Index

- Academic Credit, 19
- Academic Honors, 56
- Academic Regulations, 45-56
- Accounting, courses, *see* Management Sciences
- Achievement Tests, 45
- Activities, cultural, 84; recreational, 86; religious, 80
- Administration, general, 8; general academic, 8
- Admission, 91; procedures, 92; requirements, 91
- Advanced Placement Program, 45
- Advanced Courses, 20, 107
- Advising, 48
- Aerospace Studies, 107
- African Studies, 64
- Afro-American Studies, 108
- Agreements with Other Universities, 75
- Air Force Reserve Officers Training Corps, 69, 107
- American Dance Festival, 76
- Anatomy, *see* Medicine, School of
- Anthropology, Department of, 109
- Application for Admission, 92
- Arabic, *see* Asian and African Languages
- Archives, university, 14
- Army Military Science, 227
- Army Reserve Officers' Training Corps, 69, 227
- Art and Art History, Department of, 116
- Arts, Institute of the, 66, 123; dance, 125
- Arts and Sciences, *see* Trinity College of Arts and Sciences
- Asian-Pacific Studies, 64
- Asian and African Languages, 127
- Associated Students of Duke University (ASDU), 85
- Astronomy, *see* Physics
- Athletics, 86
- Attendance Regulation, 54
- Auditing, 50
- Awards, 58
- Bachelor of Arts, Program I, 19, 26; Program II, 24, 31
- Bachelor of Science, Program I, 19, 26; Program II, 24, 31
- Bachelor of Science in Engineering, 34; requirements, 35
- Bills, payment of for fall and spring, 96; summer, 97
- Biochemistry, *see* Medicine, School of
- Biology, 130
- Biomedical Engineering, courses in, 306; departmental requirements, 36
- Botany, Department of, 131
- Business Administration, *see* Management Sciences; combination program, 33
- Calendar, 6
- Campus Life and Activities, 79
- Canadian Studies, 64, 136
- Career Counseling, 82
- Caribbean Studies, 64
- Certification to teach, 176
- Change of Major, 52
- Changes in Status, 53
- Chemistry, Department of, 138
- Chinese, *see* Asian and African Languages
- Civil and Environmental Engineering, courses in, 309; departmental requirements, 37
- C-L (cross-listing), 107
- Class Attendance, 54
- Classical Studies, Department of, 141; in Italy, 72, 74
- College Board, advanced placement program, 45; tests, 45
- Combination Programs, undergraduate-professional, 32
- Commencement, 58
- Comparative Area Studies, 147
- Comparative Labor Studies, 65
- Comparative Literature, 155
- Computation Center, 14
- Computer Science, Department of, 158
- Concurrent Enrollment, 49
- Conduct, regulations governing, 88
- Continuation Requirements, Trinity College, 23, 31; School of Engineering, 41
- Continuing Education, 65, 93, 97
- Counseling and Psychological Services, 81
- Course Changes, for the summer terms, 49; in the fall and spring terms, 49
- Course Credit, 19
- Course Load, 50
- Course Numbering System, 107
- Courses of Instruction, 107; *see also* departmental listings
- Cultural Affairs, Office of, 84
- Credit, 19
- Cum laude*, 57
- Curricular Requirements, Program I, 26; Program II, 24, 31; Bachelor of Science in Engineering, 34
- Dance, 125
- Dean's List, 56
- Dean's List with Distinction, 56
- Declaration of Major or Division, 51
- Degrees Offered, Trinity, 19; Engineering, 19, 34
- Degree Status, full-time and part-time, 54, 91
- Department Major, 21; *see also* departmental listings
- Dining Facilities, 80, 99
- Diploma Cards, 58
- Discussion Section, definition of, 22
- Distinguished Professor Courses, 163
- Distribution of Courses, 20, 27
- Divisions of Learning, 26
- Divisional Requirements, *see* Program I, Distribution of Courses
- Double Major, 21, 29, 53
- Dormitories, *see* "Residential Facilities" or "Housing"
- Drama, 164
- Drop-Add Period, 49
- Duke Futures Programs, 76
- Duke University, history of, 11
- Economics, Department of, 168
- Education, 174
- Education Records, 61
- Electrical Engineering, courses in, 316; departmental requirements, 38
- Eligibility for Courses, 50
- Employment Opportunities, 105
- Engineering, *see* School of Engineering
- English, Department of, 176
- Excused Absences, class attendance, 54
- Expenses, estimate of, 95; living, 99
- Faculty, 12
- Failing Grades, 56
- Fees, registration, 96; transcripts, 97
- Fields of Knowledge Requirements, 26
- Film and Video, Program in, 66, 184
- Final Examinations, 55; absence from, 55
- Financial Aid, 100

- Financial Information, 95
- First Division, *see* Distribution of Courses
- Food Services, 80, 99
- Foreign Language, proficiency in, 26, 27
- Foreign Language Requirement, 26, 27, and *see* individual departmental majors
- Forestry and Environmental Studies, combination program, 32; courses in, 185
- French, *see* Romance Languages, Department of
- Full-Time Degree Status, 54
- Genetics, The University Program in, 135, 186
- Geology, Department of, 187
- German, *see* Germanic Languages and Literature
- Germanic Languages and Literature, Department of, 191
- Gift Scholarships, 101
- Government, student, 85
- Grading and Grade Requirements, 55
- Graduate School, courses, 50; preparation for, 32
- Graduation Honors, 56
- Graduation, notification of intention, 58
- Graduation Requirements, Program I, 23; Program II, 24; School of Engineering, 34
- Graduation with Distinction, 57
- Greek, *see* Classical Studies, Department of
- Grievance Procedures, 88
- Health, Physical Education, and Recreation, Department of, 86, 194
- Health Services, 81
- Hebrew, *see* Asian and African Languages
- Hindi-Urdu, *see* Asian and African Languages
- History, Department of, 197
- Honor Commitment, Duke student, 87
- Honors, 57
- House Courses, 51
- Housing, resident and nonresident, 79; expenses, 99
- Howard University, exchange program, 75
- Human Development courses, 207; program in, 66
- Humanities, *see* Distribution of Courses
- Identification Cards, 48
- Incompleted Work, 51
- Independent Study, 51
- Individually Designed Plans of Study, *see* Program II
- Institute of the Arts, *see* Arts, Institute of the
- Institute of Statistics and Decision Sciences, *see* Statistics and Decision Sciences, Institute of
- Intercollegiate Athletic Program, 87
- Interdepartmental Concentration, 21, 29; procedures, 51
- Interdisciplinary Courses, 208
- Interdisciplinary Major, 21
- Interdisciplinary Programs in Engineering, 40
- Interinstitutional Agreement, 47
- International Advertising and Global Culture, 65
- International Fellowships, 58
- International House and International Office, 84
- International Studies, 63
- Intramural Activities, 86
- Introductory Courses, 107
- Islamic and Arabian Development Studies, 64
- Italian, *see* Romance Languages
- Japanese, *see* Asian and African Languages
- Judaic Studies, Cooperative Program, 67; courses in, 211
- Judicial System, 88
- Korean, *see* Asian and African Languages
- Laboratories, science, 15
- Latin, *see* Classical Studies, Department of
- Latin-American Studies, 64
- Law School, combination program, 34
- Learning Experiences, Small-Group, Program I, 21, 27, 31
- Leave of Absence, 53
- Libraries, 12
- Linguistics, 212
- Living Expenses, 99
- Loans, 104
- Magna cum laude*, 57
- Majors, Trinity, 21, 51; Engineering, 40; *see also* departmental listings
- Management Sciences, 213
- Marine Laboratory, 15, 75, 130, 214
- Marine Sciences, The University Program, 214
- Marxism and Society, program in, 67
- Mary Lou Williams Center for Black Culture, 84
- Mathematics, Department of, 216
- Mechanical Engineering, courses in, 322; departmental requirements, 39
- Media, 85
- Medicine, School of, basic science courses, 223
- Medieval and Renaissance Studies Program, 225
- Microbiology and Immunology, *see* Medicine, School of
- Military Science, 69, 227
- Minority Affairs, Office of, 82; Counseling in Academic and Social Affairs, 83; Summer Transitional Program, 83; tutoring, 83
- Music, Department of, 229; organizations, 85, theory and composition, 229
- Natural Sciences and Mathematics, *see* Distribution of Courses
- Naval Reserve Officer Training Corps, 69, 235
- Naval Science, 235
- Neurosciences, program in, 67; courses in, 237
- Newspaper, *see* Publications
- Nondiscrimination Policy, 2, 88
- Nondegree Status, 54, 92, 93
- Nonresident Students, 80
- Off-Campus Living, 80
- Organizations, student, 85
- Part-Time Degree Status, 54
- Pass/Fail Option, 56
- Passing Grades, 55
- Payment of Accounts, 96
- Persian, *see* Asian and African Languages
- Perspectives on Marxism and Society, program in, 67
- Phi Beta Kappa, 57
- Philosophy, Department of, 238
- Physical Education, *see* Health, Physical Education, and Recreation
- Physics, Department of, 242
- Physiology, Department of, *see* Medicine, School of
- Placement Services, 82
- Placement, tests, 46; in Russian, 47
- Polish, *see* Slavic Languages and Literatures
- Political Science, Department of, 245
- Portuguese, *see* Romance Languages
- Preceptorial, definition of, 30
- Precollege Program, 76
- Primate Center, 15
- Primatology, program in, 68
- Prizes and Awards, 58

- Professional Schools, combination programs, 34; preparation for, 32
- Program I, 19-24; 26-32; continuation, 23, 31; departmental major, 20, 29; distribution of courses, 20, 26; double major, 21, 29; graduation, 23, 31; interdepartmental concentration, 29; writing, 27; proficiency in foreign language, 26, 27; residence, 30; small group learning experience, 21, 27
- Program Major, 21
- Program II, 24-26; 31-32
- Project WILD, 86
- Psychological Services, 81
- Psychology, Department of, 257
- Publications, 85
- Public Policy Studies, 264
- Radio Station, 86
- Reading-out of Introductory Courses, 47
- Readmission of Former Students, 53, 93
- Recognition, for academic work, 56
- Records, release of, 61
- Recreational Activities, 86
- Refunds, 99
- Registration, 48; course changes, 49; late fee, 48, 96
- Regulations, Academic, 45-56
- Religion, Department of, 269
- Religious Activities; 80
- Requirements, Program I, curricular, 19, 26; Program II, general, 24, 31; School of Engineering, 34
- Reserve Officer Training Corps, 69, *see also* Aerospace Studies, Military Science, and Naval Science
- Residence Requirements, Program I, 22, 30; School of Engineering, 41
- Resident and Nonresident Status, 79
- Residential Facilities, 15, 79
- Residential Life, Office of, 16, 80
- Romance Languages, Department of, 276
- Rooms, *see* Housing
- Russian and East European Studies, 65
- Russian, placement, 47; *see also* Slavic Languages and Literatures
- Scholarships, 102
- Scholastic Aptitude Tests, 46
- School of Engineering, courses in, 304; degree requirements, 34; departmental requirements, 35; double major, 40; history, 11; interdisciplinary programs, 40; prizes and awards, 58-61; scholarships, 102
- Science, Technology, and Human Values, program in, 68; courses in, 285
- Secondary School Teaching, 176
- Second Division *see* Distribution of Courses
- Second Major, 21, 30, 53
- Self-pacing, 50
- Semester Course, definition of, 19
- Skill Courses, 22
- Slavic Languages and Literatures, Department of, 285
- Small Group Learning Experiences, requirement, 20
- Social Regulations, 88
- Social Sciences, *see* Distribution of Courses
- Sociology, Department of, 288
- South Asian Studies, 64
- Spanish, *see* Romance Languages, Department of
- Statistics and Decision Sciences, Institute of, 66, 295
- Student Activities, Office of, 83
- Student Affairs, 79
- Student Aid, 100
- Student Life, Office of, 83
- Study Abroad, semester and academic year programs, 70; summer programs, 72
- Summa cum laude*, 57
- Summer Festival of Creative Arts, 76
- Summer Session, admission, 93; calendar, 6; course changes, 49; housing, 97; programs abroad, 70; refunds, 100; special programs, 76; tuition and fees, 97
- Summer Theatre Institute, 76
- Swahili, *see* Asian and African Languages
- Teach, preparation to, 176
- Teaching, student, 176
- Television, 85
- Term Paper, multiple submission of, 51
- Tests, 45; standardized, 91
- Third Division, *see* Distribution of Courses
- Transcripts, fees, 97
- Transfer, admission, 93; between Duke schools and colleges, 48; of work elsewhere, 47
- Trinity College of Arts and Sciences, administration, 107; history, 11; purpose, 16
- Tuition and Fees, 95; for children of Methodist ministers, 105; for Duke employees, 97
- Tuition Plans, 96, 105
- Tutorial, definition of, 22
- Twentieth-Century America Program, 68
- Undergraduate College and Schools, history, 11; resources, 12
- Undergraduate-Professional Combination Programs, 32
- University Courses, *see* Distinguished Professor Courses
- University Union, 83
- University Writing Courses, 296
- Western Europe and Advanced Industrial Democracies Program, 65
- Withdrawal, from courses, 56; from school, 53
- Women's Studies, program in, 68; courses in, 296
- Women's research, center for, 65
- Work/Study, 105
- Writing, 296
- Yiddish, *see* Germanic Languages and Literature
- Zoology, Department of, 299

Bulletin of Duke University
(USPS 073-680)

Durham, NC 27706

POSTMASTER send change of address
to:

Office of The Registrar
Undergraduate School

Duke University

Durham, NC 27706

2nd Class
Postage
PAID
at Durham, NC

bulletin of
Duke University
1988-89

Graduate School



bulletin of
Duke University
1988-89

Graduate School

ACADEMIC LIAISON
A. Leigh DeNeef
Associate Dean

EDITOR
Judy Smith
SENIOR EDITORIAL ASSISTANTS
Jean Carlton
Elizabeth Matheson

PHOTOGRAPHS
Scott Taylor
Jimmy Wallace
Jerry Markatos

Typesetting by Paste-Ups, Ltd., Cary, North Carolina
Printed by William Byrd Press, Richmond, Virginia

The information in the bulletin applies to the academic year 1988-89 and is accurate and current, to the best of our knowledge, as of January, 1988. The University reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced University calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, call Dolores L. Burke, Equal Opportunity Officer, (919) 684-8111.

Duke University is a member of the North Carolina Association of Independent Colleges and Universities, the Southern Association of Colleges and Schools, and the Association of American Universities. Additionally, the Graduate School is affiliated with the Association of Graduate Schools and the Council of Graduate Schools.

The *Bulletin of Duke University*, Volume 60, includes the following titles: *The Fuqua School of Business*; *The School of Forestry and Environmental Studies*; *Marine Laboratory*; *Undergraduate Instruction*; *The Graduate School*; *The Medical Center*; *The Divinity School*; *Information for Prospective Students*; *The Graduate School* (short form); *The School of Law*; and *Information and Regulations*.

Volume 60

Number 2A

March 1988

The *Bulletin of Duke University* (UPS 073-680) is published by Duke University, Duke Station, Durham, North Carolina 27706 as follows: monthly—May; semimonthly—March, April, June, and August; thrice-monthly—September. Second-class postage paid at Durham, North Carolina.

Contents

Calendar of the Graduate School	4
University Administration	5
Graduate School Faculty	6
Academic and Cooperative Programs	22
Admission	26
Financial Information	32
Tuition and Fees	33
Expenses	36
Fellowships and Scholarships	37
Assistantships	39
Payment of Awards	39
Loans	39
Work-Study Program Employment	40
Summer Financial Aid	40
Registration	42
Regulations	46
General Academic Regulations	47
Degree Regulations—The Master's Degree	49
Degree Regulations—The Doctoral Degree	52
Commencement	54
Standards of Conduct	54
Courses of Instruction	58
Special and Cooperative Programs	188
Resources for Study	196
Student Life	208
Living Accommodations	209
Food Services	210
Services Available	211
Student Affairs	214
Visiting Scholars	215
Postdoctoral Research	215
Index	216

Calendar of the Graduate School*

Summer 1988†

March		
	28	Monday—Beginning of registration for summer 1988.
May		
	3	Tuesday—Beginning this day, summer drop/adds must be approved by the Director of Graduate Studies.
	4	Wednesday—Last day for registration and payment of Term I fees without \$25 late fee (before 4:30 p.m.).
	12	Thursday—Term I classes begin.
	16	Monday—Drop/add for Term I ends at 4:00 p.m.
June		
	20	Monday—Last day for registration and payment of Term II fees without \$25 late fee (before 4:30 p.m.).
	24	Friday—Term I final examinations begin.
	25	Saturday—Term I final examinations end.
	28	Tuesday—Term II classes begin.
	30	Thursday—Drop/add for Term II ends at 4:00 p.m.
August		
	1	Monday—Final date for filing with the Graduate School office the intention to receive an advanced degree in September.
	10	Wednesday—Term II final examinations begin.
	11	Thursday—Term II final examinations end.

Fall 1988

August		
	22	Monday—Drop/add for graduate students who registered in March.
	22	Monday—Consultations with Directors of Graduate Studies.
	22	Monday—English examination for foreign students. (See chapter "Admission" for section on additional procedures for foreign students).
	23-24	Tuesday-Wednesday—Registration of all new and nonregistered returning students in the Graduate School.
	26	Friday—Graduate and Professional School opening convocation.
	29	Monday—Fall semester classes begin.
	31	Wednesday—Late registration and drop/add.
September		
	1	Thursday—Drop/add continues.
	2	Friday—Drop/add continues. Final date for changing registration with reduction in fees. Final date for changing enrollment status from full-time to part-time.
	5	Monday—Labor Day. Classes in session.
	6-9	Tuesday-Friday—Drop/add continues.
	9	Friday—Final date for changes in registration which involve adding courses.
	12-23	Monday-Friday—Drop/add continues for dropping course/seminar registration and adding equivalent units of ungraded research or residence.
October		
	14	Friday—Fall break begins.
	19	Wednesday—Classes resume.
November		
	7-8	Monday-Tuesday—Registration for spring semester 1989.
	23	Wednesday—Thanksgiving recess begins.
	28	Monday—Classes resume.

*The dates in this calendar are subject to change.

†The School of Forestry and Environmental Studies, the Fuqua School of Business, the Marine Laboratory, the Department of Health Administration, and the Department of Physical Therapy have different term lengths and/or starting dates during the summer; consult the appropriate bulletins and schedules.

December

- 1 Thursday—Final date for filing with the Graduate School office the intention to receive an advanced degree in December.
- 2 Friday—Graduate classes end.
- 3-11 Saturday-Sunday—Graduate reading period; length of 200-level course reading period is determined by the instructor.
- 11 Sunday—Founders' Day.
- 12-17 Monday-Saturday—Final examinations.

Spring 1989

January

- 10 Tuesday—Drop/add for graduate students who registered in November.
- 10 Tuesday—English examination for foreign students. (111 Biological Sciences Building—See chapter "Admission" for section on additional procedures for foreign students.)
- 11 Wednesday—Registration for all new and nonregistered returning students in the Graduate School.
- 12 Thursday—Spring semester classes begin.
- 13 Friday—Late registration and drop/add.
- 16-18 Monday-Wednesday—Drop/add continues.
- 18 Wednesday—Final date for changing registration with reduction in fees. Final date for changing enrollment status from full-time to part-time.
- 19-25 Thursday-Wednesday—Drop/add continues.
- 25 Wednesday—Final date for changes in registration which involve adding courses.
- 25-31 Wednesday-Tuesday—Drop/add continues for dropping course/seminar registration and adding equivalent units of ungraded research or residence.

February

- 1 Wednesday—Final date for filing with the Graduate School office the intention to receive an advanced degree in May.
- 1-3 Wednesday-Friday—Drop/add continues for dropping course/seminar registration and adding equivalent units of ungraded research or residence.
- 3 Wednesday—Final date for dropping course/seminar registration and adding equivalent units of ungraded research or residence.

March

- 10 Friday—Spring recess begins.
- 20 Monday—Classes resume.
- 31 Friday—Final date for submitting dissertation for the Ph.D. degree.

April

- 3-4 Monday-Tuesday—Registration for fall semester 1989 and beginning of registration for summer 1989.
- 17 Monday—Final date for submitting theses for master's degrees.
- 21 Friday—Spring semester classes end.
- 22-30 Saturday-Sunday—Graduate reading period; length of 200-level course reading period is determined by the instructor.
- 28 Friday—Final day for completing degree requirements for an advanced degree to be awarded in May 1989. All final copies of examined and signed theses and dissertations must be returned to the Graduate School office by this date.

May

- 1 Monday—Final examinations begin.
- 6 Saturday—Final examinations end.
- 12 Friday—Commencement begins.
- 14 Sunday—Graduate exercises. Conferring of degrees.

University Administration

General Administration

- H. Keith H. Brodie, M.D., LL.D., *President*
- Phillip A. Griffiths, Ph.D., *Provost*
- Eugene J. McDonald, LL.M., *Executive Vice-President, Administration*
- William G. Anlyan, M.D., D.Sc., *Chancellor*
- Joel L. Fleishman, LL.M., *Vice-President*
- J. Peyton Fuller, A.B., *Vice-President, Planning and Treasurer*

William J. Griffith, A.B., *Vice-President for Student Affairs*
John J. Piva, Jr., B.A., *Vice-President for Alumni Affairs and Development*
Patricia C. Skarulis, M.A., *Vice-President for Information Systems*
Andrew G. Wallace, M.D., *Vice-President for Health Affairs*
John F. Adcock, M.B.A., *Corporate Controller*
N. Allison Haltom, A.B., *Secretary of the University*

Graduate School Administration

Malcolm Gillis, Ph.D., *Dean of the Graduate School*
A. Leigh DeNeef, Ph.D., *Associate Dean*
Donna Lee Giles, A.B., *Assistant Dean*
Katharine Pfeiffer, M.A., *Assistant Dean*
Aleane G. Webb, *Assistant Dean*

Executive Committee of the Graduate Faculty

Dean Malcolm Gillis
William Ascher
Robert Bates
Jeffrey R. Dawson
Alfred Goshaw
Herbert Hacker
Stanley Hauerwas
Robert Hochmuth
Peter Lange
Annabel Patterson
George Pearsall
Salvatore Pizzo
Lewis Siegel
Kathleen Smith
Larry Todd
Bruce Wardropper
Charles Young

Graduate School Faculty

(As of November 1, 1987.)

The date denotes the first year of service at Duke University.

John Lloyd Abernethy (1984), M.D., Ph.D., *Assistant Professor of Pathology*
Mohamed Bahie Abou-Donia (1975), Ph.D., *Professor of Pharmacology*
Dolph O. Adams (1972), M.D., Ph.D., *Professor of Pathology and Associate Professor of Immunology*
John H. Aldrich (1987), Ph.D., *Professor of Political Science*
Irving E. Alexander (1963), Ph.D., *Professor of Psychology*
Dimitri Alexandrou (1987), Ph.D., *Assistant Professor of Electrical Engineering*
Ralph J. Alig (1986), Ph.D., *Adjunct Assistant Professor of Forest Economics*
William K. Allard (1975), Ph.D., *Professor of Mathematics*
A. Tito Alt (1961-65; 1967), Ph.D., *Associate Professor of Germanic Languages and Literature*
D. Bernard Amos (1962), M.D., *James B. Duke Professor of Immunology*
Carl L. Anderson (1955), Ph.D., *Professor of English*
Nels C. Anderson (1966), Ph.D., *Associate Professor of Physiology*
Page A. W. Anderson (1973), M.D., *Assistant Professor of Physiology*
Edna Andrews (1984), Ph.D., *Assistant Professor of Slavic Languages and Literatures*
Robert Anholt (1986), Ph.D., *Assistant Professor of Physiology*
Janis Antonovics (1970), Ph.D., *Professor of Botany*
James W. Applewhite (1971), Ph.D., *Associate Professor of English*
Mahadev L. Apte (1965), Ph.D., *Professor of Anthropology*
Yair Argon (1984), Ph.D., *Assistant Professor of Immunology*
Edward M. Arnett (1980), Ph.D., *R. J. Reynolds Industries Professor of Chemistry*
William Louis Ascher (1984), Ph.D., *Professor of Public Policy Studies and Professor of Political Science*
Alison Hubbard Ashton (1986), Ph.D., *Associate Professor of Business Administration*
Robert H. Ashton (1986), Ph.D., *Professor of Business Administration*
Kurt W. Back (1959), Ph.D., *James B. Duke Professor of Sociology*
Lloyd Richard Bailey (1971), Ph.D., *Associate Professor of Old Testament*
Paul A. Baker (1981), Ph.D., *Associate Professor of Geology*
Andrew E. Balber (1983), Ph.D., *Associate Medical Research Professor of Immunology*
Steven W. Baldwin (1970), Ph.D., *Professor of Chemistry*

Helmy Hamdollah Baligh (1967), Ph.D., *Professor of Business Administration*
 Robert H. Ballantyne (1962), Ed.D., *Associate Professor of Education*
 Bruce W. Ballard (1981), Ph.D., *Associate Professor of Computer Science*
 James David Barber (1972), Ph.D., *James B. Duke Professor of Political Science and Professor of Public Policy Studies*
 Roger C. Barr (1969), Ph.D., *Professor of Biomedical Engineering*
 Elizabeth C. Bartlett (1982), Ph.D., *Assistant Professor of Music*
 Robert Charles Bartlett (1976), M.A., *Professor of Physical Therapy*
 Jorge Valls Bartolome (1978), Ph.D., *Assistant Medical Research Professor of Pharmacology*
 Deepak Bastia (1979), Ph.D., *Professor of Microbiology*
 Robert H. Bates (1985), Ph.D., *Henry R. Luce Professor of Political Science*
 Joseph Battle (1970), Ph.D., *Associate Professor of Business Administration*
 Gilbert Baumann (1976), Dr. Sc., *Assistant Medical Research Professor of Physiology*
 James R. Baumgardner (1985), Ph.D., *Assistant Professor of Economics*
 J. Thomas Beale (1983), Ph.D., *Professor of Mathematics*
 Hie Ping Beall (1975), Ph.D., *Assistant Medical Research Professor of Anatomy*
 Michael Been (1987), Ph.D., *Assistant Professor of Biochemistry*
 Robert D. Behn (1973), Ph.D., *Associate Professor of Public Policy Studies*
 Robert Paul Behringer (1982), Ph.D., *Associate Professor of Physics*
 Wolfgang Bein (1986), Ph.D., *Research Assistant Professor of Computer Science*
 Adrian Bejan (1984), Ph.D., *Professor of Mechanical Engineering and Materials Science*
 David F. Bell III (1983), Ph.D., *Assistant Professor of Romance Languages*
 Joanne M. Bell (1985), Ph.D., *Assistant Medical Research Professor of Pharmacology*
 Robert M. Bell (1972), Ph.D., *Professor of Biochemistry*
 Peter Brian Bennett (1972), Ph.D., *Associate Professor of Physiology*
 Vann Bennett (1987), Ph.D., *Professor of Biochemistry*
 Teresa Berger (1987), Ph.D., *Assistant Professor of Religion*
 Charles W. Bergquist (1972), Ph.D., *Professor of History*
 James R. Bettman (1982), Ph.D., *Burlington Industries Professor of Business Administration*
 L. C. Biedenharn, Jr. (1961), Ph.D., *Professor of Physics*
 Alan Biermann (1974), Ph.D., *Professor of Computer Science*
 Darell D. Bigner (1972), M.D., Ph.D., *Professor of Pathology*
 Sandra H. Bigner (1977), M.D., *Professor of Pathology*
 Edward George Bilpuch (1962), Ph.D., *Professor of Physics*
 Minmay Biswas (1983), Ph.D., *Associate Professor of Civil Engineering*
 Perry J. Blackshear (1985), M.D., Ph.D., *Assistant Professor of Biochemistry*
 Kalman P. Bortman (1973), Ph.D., *Associate Professor of Religion*
 Donald Bliss (1985), Ph.D., *Associate Professor of Mechanical Engineering and Materials Science*
 Sherman Bloomer (1983), Ph.D., *Assistant Professor of Geology*
 J. J. Blum (1962), Ph.D., *James B. Duke Professor of Physiology*
 John A. Board, Jr. (1986), Ph.D., *Assistant Professor of Electrical Engineering and Assistant Professor of Computer Science*
 Mary T. Boatwright (1979), Ph.D., *Associate Professor of Classical Studies*
 Dani P. Bolognesi (1971), Ph.D., *Professor of Virology*
 Celia Bonaventura (1972), Ph.D., *Associate Professor of Physiology*
 Joseph Bonaventura (1972), Ph.D., *Associate Professor of Physiology*
 James F. Bonk (1959), Ph.D., *Professor of Chemistry*
 William James Booth (1985), Ph.D., *Assistant Professor of Political Science*
 Frank Borchardt (1971), Ph.D., *Associate Professor of Germanic Languages and Literature*
 Lloyd J. Borstelmann (1953), Ph.D., *Professor of Psychology*
 Edward H. Bossen (1972), M.D., *Professor of Pathology*
 William F. Boulding (1984), Ph.D., *Assistant Professor of Business Administration*
 Stephen G. Boyce (1981), Ph.D., *Adjunct Professor of Natural Resources*
 John E. Boynton (1968), Ph.D., *Professor of Botany*
 William D. Bradford (1966), M.D., *Professor of Pathology*
 Ralph Braibanti (1953), Ph.D., *James B. Duke Professor of Political Science*
 Eleanor F. Branch (1972), Ph.D., *Associate Professor of Physical Therapy*
 Robert N. Brandon (1979), Ph.D., *Andrew W. Mellon Associate Professor of Philosophy*
 Douglas T. Breeden (1985), Ph.D., *Associate Professor of Economics*
 Philip L. Brock (1982), Ph.D., *Assistant Professor of Economics*
 Arnold Ralph Brody (1978), Ph.D., *Adjunct Assistant Professor of Pathology*
 Caroline A. Bruzelius (1981), Ph.D., *Andrew W. Mellon Associate Professor of Art History*
 Robert Bryant (1987), Ph.D., *Arts and Sciences Professor of Mathematics*
 James D. Bryers (1985), Ph.D., *Associate Professor of Civil and Environmental Engineering and Associate Professor of Biomedical Engineering*
 C. Edward Buckley III (1963), M.D., *Assistant Professor of Microbiology and Immunology*

Rebecca Buckley (1968), M.D., *Professor of Immunology*
 Louis J. Budd (1952), Ph.D., *James B. Duke Professor of English*
 M. Vickers Burdett (1977), Ph.D., *Assistant Medical Research Professor of Microbiology*
 Donald S. Burdick (1962), Ph.D., *Associate Professor of Mathematics and Associate Professor of Biomedical Engineering*
 Peter C. Burger (1973), M.D., *Associate Professor of Pathology*
 Peter Burian (1968), Ph.D., *Associate Professor of Classical Studies*
 Marian Burke (1982), Ph.D., *Associate Professor of Business Administration*
 Richard M. Burton (1970), D.B.A., *Professor of Business Administration*
 Jane Butt (1985), Ph.D., *Assistant Professor of Business Administration*
 Ronald Richard Butters (1967), Ph.D., *Associate Professor of English*
 Gale H. Buzzard (1957), Ph.D., *Assistant Professor of Mechanical Engineering*
 Nancy E. Cahill (1987), J.D., *Adjunct Assistant Professor of Health Administration*
 Clark R. Cahow (1960), Ph.D., *Arts and Sciences Professor of History*
 Dennis M. Campbell (1982), Ph.D., *Professor of Theology*
 Ted Allen Campbell (1986), Ph.D., *Assistant Professor of Religion*
 Enrico Mario Camporesi (1977), M.D., *Assistant Professor of Physiology*
 David T. Canon (1987), Ph.D., *Assistant Professor of Political Science*
 Nell B. Cant (1978), Ph.D., *Associate Professor of Anatomy*
 Peter F. Carbone (1966), Ed.D., *Associate Professor of Education*
 Marc Caron (1983), Ph.D., *Associate Professor of Physiology*
 Christopher R. Carroll (1981), Ph.D., *Assistant Professor of Electrical Engineering*
 Robert C. Carson (1960), Ph.D., *Professor of Psychology*
 Reginald D. Carter (1971), Ph.D., *Adjunct Assistant Professor of Physiology*
 Matt Cartmill (1969), Ph.D., *Professor of Anatomy and Professor of Anthropology*
 Ernesto Caserta (1970), Ph.D., *Associate Professor of Romance Languages*
 H. Craig Casey, Jr. (1979), Ph.D., *Professor of Electrical Engineering*
 John H. Casseday (1972), Ph.D., *Adjunct Associate Professor of Psychology*
 David Castriota (1985), Ph.D., *Assistant Professor of Art History*
 John Cell (1962), Ph.D., *Professor of History*
 Jack B. Chaddock (1966), Sc.D., *Professor of Mechanical Engineering*
 William Chafe (1971), Ph.D., *Professor of History*
 Jagdish Chandra (1974), Ph.D., *Adjunct Professor of Mathematics*
 Margaret Cheney (1984), Ph.D., *Assistant Professor of Mathematics*
 Robert S. Cherry (1987), Ph.D., *Assistant Professor of Mechanical Engineering and Materials Science*
 Donald B. Chesnut (1965), Ph.D., *Professor of Chemistry*
 Norman L. Christensen, Jr. (1973), Ph.D., *Professor of Botany and Professor of Forestry*
 Mikael Ciftan (1967), Ph.D., *Adjunct Professor of Physics*
 Elizabeth Ann Clark (1982), Ph.D., *Professor of Religion*
 Howard G. Clark (1968), Ph.D., *Professor of Biomedical Engineering and Professor of Materials Science*
 Charles T. Clotfelter (1979), Ph.D., *Professor of Public Policy Studies and Professor of Economics*
 John MacKenzie Clum (1966), Ph.D., *Associate Professor of English*
 A. W. Coats (1984), Ph.D., *Research Professor of Economics*
 Franklin H. Cocks (1972), Sc.D., *Professor of Materials Science*
 Kalman J. Cohen (1974), Ph.D., *Distinguished Bank Research Professor and Professor of Business Administration*
 John D. Coie (1968), Ph.D., *Professor of Psychology*
 Joel Colton (1947), Ph.D., *Professor of History*
 William K. Condrell (1982), J.D., *Adjunct Professor of Forestry*
 Philip J. Cook (1973), Ph.D., *Professor of Public Policy Studies and Professor of Economics*
 Joseph M. Corless (1972), M.D., Ph.D., *Associate Professor of Anatomy*
 Roger J. Corless (1970), Ph.D., *Associate Professor of Religion*
 Ronald B. Corley (1977), Ph.D., *Associate Professor of Immunology*
 Bruce Hayward Corliss (1984), Ph.D., *Associate Professor of Geology*
 Philip R. Costanzo (1968), Ph.D., *Professor of Psychology*
 Martin Joseph Costello III (1975), Ph.D., *Assistant Professor of Anatomy*
 John D. Costlow, Jr. (1959), Ph.D., *Professor of Zoology*
 William M. Coughran (1985), Ph.D., *Adjunct Associate Professor of Computer Science*
 Sheila J. Counce (1968), Ph.D., *Professor of Anatomy*
 Barbara J. Crain (1986), *Assistant Professor of Anatomy and Assistant Professor of Pathology*
 James D. Crapo (1986), Ph.D., *Associate Professor of Pathology*
 James Crenshaw (1987), Ph.D., *Professor of Religion*
 Peter Cresswell (1973), Ph.D., *Professor of Immunology*
 Herbert F. Crovitz (1963), Ph.D., *Adjunct Professor of Psychology*
 Alvin L. Crumbliss (1970), Ph.D., *Professor of Chemistry*
 Chicita F. Culberson (1971), Ph.D., *Adjunct Professor of Botany*

William Louis Culberson (1955), Ph.D., *Hugo L. Blomquist Professor of Botany*
 Ronald Y. Cusson (1970), Ph.D., *Professor of Physics*
 Frederick Daniels (1986), Ph.D., *Assistant Professor of Biomedical Engineering*
 Richard L. Daniels (1986), Ph.D., *Assistant Professor of Business Administration*
 David G. Davies (1961), Ph.D., *Professor of Economics*
 Calvin D. Davis (1962), Ph.D., *Professor of History*
 James Norman Davis (1972), M.D., *Professor of Pharmacology*
 Lucy T. Davis (1969), Ed.D., *Associate Professor of Education*
 Richard L. Davis (1983), Ph.D., *Assistant Professor of History*
 Jeffrey R. Dawson (1972), Ph.D., *Associate Professor of Immunology*
 Eugene Davis Day (1962), Ph.D., *Professor of Immunology*
 Ruth S. Day (1978), Ph.D., *Associate Professor of Psychology*
 David C. Dellinger (1986), Ph.D., *Associate Professor of Business Administration*
 Frank C. De Lucia (1969), Ph.D., *Professor of Physics*
 Neil Barry de Marchi (1971-80; 1983), Ph.D., *Professor of Economics*
 A. Leigh DeNeef (1969), Ph.D., *Professor of English*
 Vincent W. Dennis (1973), M.D., *Assistant Professor of Physiology*
 Irving T. Diamond (1958), Ph.D., *James B. Duke Professor of Psychology, Professor of Physiology, and Lecturer in Anatomy*
 Joseph Di Bona (1967), Ph.D., *Associate Professor of Education*
 Robert Dickens (1949), Ph.D., *Professor of Business Administration*
 Michael P. Dieter (1986), Ph.D., *Adjunct Professor of Ecotoxicology*
 Richard T. Di Giulio (1982), Ph.D., *Assistant Professor of Ecotoxicology*
 Arif Dirlik (1971), Ph.D., *Associate Professor of History*
 Apostolos Dollas (1986), Ph.D., *Assistant Professor of Electrical Engineering*
 Virginia R. Domínguez (1979), Ph.D., *Associate Professor of Anthropology*
 William J. Donelan (1982), M.S., *Adjunct Assistant Professor of Health Administration*
 Earl H. Dowell (1983), Sc.D., *Professor of Mechanical Engineering*
 Joanne Bechta Dugan (1985), Ph.D., *Assistant Professor of Computer Science and Research Assistant Professor of Electrical Engineering*
 Pamela W. Duncan (1979), M.A.C.T., *Assistant Professor of Physical Therapy*
 Robert F. Durden (1952), Ph.D., *Professor of History*
 Dan Durning (1985), Ph.D., *Assistant Professor of Public Policy Studies*
 George F. Dutrow (1976), Ph.D., *Professor of Forestry*
 Carol O. Eckerman (1972), Ph.D., *Associate Professor of Psychology*
 David M. Eddy (1981), M.D., Ph.D., *Professor of Public Policy Studies and Professor of Community and Family Medicine*
 Julie A. Edell (1981), Ph.D., *Associate Professor of Business Administration*
 Leah Edelstein (1984), Ph.D., *Lecturer in Mathematics*
 Eric L. Effmann (1977), M.D., *Associate Professor of Anatomy*
 Jane G. Elchlepp (1960), M.D., Ph.D., *Associate Professor of Pathology*
 Albert Eldridge (1970), Ph.D., *Associate Professor of Political Science*
 Everett H. Ellinwood, Jr. (1966), M.D., *Professor of Pharmacology*
 Carla S. Ellis (1986), Ph.D., *Associate Professor of Computer Science*
 John L. Ellis (1986), Ph.D., *Research Associate Professor of Computer Science*
 Sharyn Endow (1978), Ph.D., *Associate Professor of Microbiology and Immunology*
 Peter C. English (1978), M.D., Ph.D., *Associate Professor of History*
 Robert M. Entman (1980), Ph.D., *Assistant Professor of Public Policy Studies and Assistant Professor of Political Science*
 Carl J. Erickson (1966), Ph.D., *Professor of Psychology*
 Harold P. Erickson (1970), Ph.D., *Professor of Anatomy*
 Robert P. Erickson (1961), Ph.D., *Professor of Psychology and Associate Professor of Physiology*
 Lawrence E. Evans (1963), Ph.D., *Professor of Physics*
 Janet J. Ewald (1984), Ph.D., *Assistant Professor of History*
 Richard B. Fair (1981), Ph.D., *Professor of Electrical Engineering*
 Henry A. Fairbank (1962), Ph.D., *Professor of Physics*
 David J. Falcone (1975), M.H.A., Ph.D., *Associate Professor of Health Administration*
 Bruce Faust (1987), Ph.D., *Assistant Professor of Forestry and Environmental Studies*
 John Morton Fein (1950), Ph.D., *Professor of Romance Languages*
 Michael T. Ferejohn (1983), Ph.D., *Assistant Professor of Philosophy*
 Oliver W. Ferguson (1957), Ph.D., *Professor of English*
 Bernard F. Fetter (1951), M.D., *Professor of Pathology*
 Carol Fierke (1987), Ph.D., *Assistant Professor of Biochemistry*
 Olivera J. Finn (1982), Ph.D., *Assistant Professor of Immunology*
 Valeria Finucci (1986), Ph.D., *Assistant Professor of Romance Languages*
 Peter G. Fish (1969), Ph.D., *Professor of Political Science*
 Stanley Fish (1985), Ph.D., *Arts and Sciences Professor of English*
 David Fitzpatrick (1983), Ph.D., *Assistant Professor of Anatomy*

Joel Fleishman (1971), LL.M., *Professor of Public Policy Studies*
 Donald J. Fluke (1958), Ph.D., *Professor of Zoology*
 John D. Forsyth (1978), D.B.A., *Professor of Business Administration*
 Lloyd R. Fortney (1964), Ph.D., *Associate Professor of Physics*
 Richard B. Forward (1971), Ph.D., *Associate Professor of Zoology*
 F. Douglas Foster (1986), Ph.D., *Assistant Professor of Business Administration*
 Richard G. Fox (1968), Ph.D., *Professor of Anthropology*
 Jennifer Francis (1987), Ph.D., *Assistant Professor of Business Administration*
 Bertram O. Fraser-Reid (1983), Ph.D., *James B. Duke Professor of Chemistry*
 Karen Z. Frenzel (1986), Ph.D., *Research Assistant Professor of Electrical Engineering*
 Irwin Fridovich (1958), Ph.D., *James B. Duke Professor of Biochemistry*
 Mary Fulkerson (1987), Ph.D., *Assistant Professor of Religion*
 Jane Marie Gaines (1982), Ph.D., *Assistant Professor of English*
 Thomas M. Gallie, Jr. (1954-55; 1956), Ph.D., *Professor of Computer Science*
 Miguel Garcí-Gómez (1973), Ph.D., *Professor of Romance Languages*
 Carl L. Gardner (1986), Ph.D., *Assistant Professor of Computer Science and Assistant Professor of Mathematics*
 Grant W. Gardner (1981), Ph.D., *Associate Professor of Business Administration*
 Devendra P. Garg (1972), Ph.D., *Professor of Mechanical Engineering*
 David Barry Gaspar (1983), Ph.D., *Associate Professor of History*
 Raymond Gavins (1970), Ph.D., *Associate Professor of History*
 Linda K. George (1976), Ph.D., *Associate Professor of Sociology*
 Rhett Truesdale George, Jr. (1957), Ph.D. *Assistant Professor of Electrical Engineering*
 John G. Georgiadis (1987), Ph.D., *Assistant Professor of Mechanical Engineering and Materials Science*
 Gerald E. Gerber (1962), Ph.D., *Associate Professor of English*
 Gary Gereffi (1980), Ph.D., *Associate Professor of Sociology*
 John F. Geweke (1983), Ph.D., *Kenan Professor of Economics*
 Michael A. Gillespie (1983), Ph.D., *Assistant Professor of Political Science*
 Nicholas W. Gillham (1968), Ph.D., *James B. Duke Professor of Zoology*
 Bryan Gilliam (1986), Ph.D., *Assistant Professor of Music*
 Stephen Malcolm Gillis (1984), Ph.D., *Professor of Public Policy Studies and Professor of Economics*
 Kenneth E. Glander (1975), Ph.D., *Associate Professor of Anthropology*
 Robert F. Gleckner (1978), Ph.D., *Professor of English*
 Rona Goffen (1978), Ph.D., *Professor of Art History*
 Martin P. Golding (1976), Ph.D., *Professor of Philosophy*
 Craufurd Goodwin (1962), Ph.D., *James B. Duke Professor of Economics*
 Lawrence C. Goodwyn (1971), Ph.D., *Associate Professor of History*
 George D. Gopen (1985), Ph.D., *Assistant Professor of English*
 Andrew Gordon (1985), Ph.D., *Associate Professor of History*
 Ulrich M. Gösele (1984), Ph.D., *Professor of Mechanical Engineering*
 Alfred T. Goshaw (1973), Ph.D., *Professor of Physics*
 Henry G. Grabowski (1972), Ph.D., *Professor of Economics*
 Daniel A. Graham (1969), Ph.D., *Professor of Economics*
 Doyle G. Graham (1970), M.D., Ph.D., *Professor of Pathology*
 Ruth W. Grant (1987), Ph.D., *Assistant Professor of Political Science*
 Monica Green (1987), Ph.D., *Assistant Professor of History*
 Ronald C. Greene (1958), Ph.D., *Associate Professor of Biochemistry*
 Joseph C. Greenfield (1962), M.D., *Associate Professor of Physiology*
 Arno L. Greenleaf (1977), Ph.D., *Associate Professor of Biochemistry*
 Henry S. Greenside (1986), *Associate Professor of Computer Science and Associate Professor of Physics*
 Christopher Gresov (1987), Ph.D., *Associate Professor of Business Administration*
 Joseph M. Grieco (1982), Ph.D., *Assistant Professor of Political Science*
 Phillip A. Griffiths (1983), Ph.D., *James B. Duke Professor of Mathematics*
 Samson R. Gross (1960), Ph.D., *Professor of Genetics and Professor of Biochemistry*
 Bobby D. Guenther (1980), Ph.D., *Adjunct Professor of Physics*
 John W. Gutknecht (1969), Ph.D., *Professor of Physiology*
 Janet Gwyer (1987), Ph.D., *Assistant Professor of Physical Therapy*
 Donald B. Hackel (1960), M.D., *Professor of Pathology*
 Herbert Hacker, Jr. (1965), Ph.D., *Associate Professor of Electrical Engineering*
 Warren G. Hall (1982), Ph.D., *Professor of Psychology*
 William C. Hall (1970), Ph.D., *Professor of Anatomy and Adjunct Professor of Psychology*
 William E. Hammond (1968), Ph.D., *Professor of Biomedical Engineering*
 Moo-Young Han (1967), Ph.D., *Professor of Physics*
 Stuart Handwerger (1971), M.D., *Assistant Professor of Physiology*
 Charles Morgan Harman (1961), Ph.D., *Professor of Mechanical Engineering*
 Campbell Harvey (1986), Ph.D., *Assistant Professor of Business Administration*

Stanley Hauerwas (1984), Ph.D., *Professor of Theological Ethics*
 Thomas M. Havrilesky (1969), Ph.D., *Professor of Economics*
 Barton Ford Haynes (1980), M.D., *Assistant Professor of Immunology*
 Robert G. Healy (1985), Ph.D., *Adjunct Associate Professor of Forestry and Environmental Studies*
 Michael Hemler (1987), Ph.D., *Assistant Professor of Business Administration*
 James M. Henderson (1986), Ph.D., *Research Professor of Economics*
 Robert William Henkens (1968), Ph.D., *Associate Professor of Chemistry*
 Eric Herbst (1980), Ph.D., *Professor of Physics*
 C. John Herington (1987), M.A., *Arts and Sciences Professor of Classical Studies*
 Duncan Heron (1950), Ph.D., *Professor of Geology*
 Cynthia B. Herrup (1984), Ph.D., *Assistant Professor of History*
 Michael Steven Hershfield (1976), M.D., *Assistant Professor of Biochemistry*
 Frederick Herzog (1960), Th.D., *Professor of Systematic Theology*
 Paula Higgins (1984), Ph.D., *Assistant Professor of Music*
 Robert Hill (1986), Ph.D., *Assistant Professor of Music*
 Robert L. Hill (1961), Ph.D., *James B. Duke Professor of Biochemistry*
 Michael Lee Hines (1978), Ph.D., *Assistant Medical Research Professor of Physiology*
 Robert M. Hochmuth (1978), Ph.D., *Professor of Biomedical Engineering*
 Richard Earl Hodel (1965), Ph.D., *Associate Professor of Mathematics*
 Peter C. Holland (1986), Ph.D., *Associate Professor of Psychology*
 Irving B. Holley, Jr. (1947), Ph.D., *Professor of History*
 Mark A. Holliday (1986), *Assistant Professor of Computer Science*
 Edward V. Holmes (1986), M.D., *Associate Professor of Biochemistry*
 Ole R. Holsti (1974), Ph.D., *George V. Allen Professor of Political Science*
 Donald L. Horowitz (1980), LL.M., Ph.D., *Professor of Public Policy Studies and Professor of Political Science*
 Jerry F. Hough (1973), Ph.D., *James B. Duke Professor of Political Science and Professor of Public Policy Studies*
 Calvin R. Howell (1984), Ph.D., *Assistant Professor of Physics*
 Tao-shih Hsieh (1981), Ph.D., *Associate Professor of Biochemistry*
 Joel C. Huber (1978), Ph.D., *Associate Professor of Business Administration*
 Tomasz A. Hueckel (1986), Ph.D., Sc.D., *Associate Professor of Civil Engineering*
 Alexander Hull (1962), Ph.D., *Associate Professor of Romance Languages*
 William F. Hyde (1979), Ph.D., *Associate Professor of Forestry and Environmental Studies*
 William L. Hylander (1971), Ph.D., *Professor of Anatomy and Associate Professor of Anthropology*
 Raymond E. Ideker (1978), M.D., Ph.D., *Associate Professor of Pathology*
 Wallace Jackson (1965), Ph.D., *Professor of English*
 B. Jon Jaeger (1972), Ph.D., *Professor of Health Administration*
 Stephen Jaffe (1983), A.M., *Assistant Professor of Music*
 Emma Raff Jakoi (1977), Ph.D., *Assistant Professor of Anatomy*
 Fredric R. Jameson (1985), Ph.D., *Professor of Comparative Literature and Professor of Romance Languages*
 Thomas Janoski (1987), Ph.D., *Assistant Professor of Sociology*
 Benjamin A. Jayne (1976), Ph.D., *Professor of Forestry*
 Peter W. Jeffs (1964), Ph.D., *Professor of Chemistry*
 Robert B. Jennings (1975), M.D., *James B. Duke Professor of Pathology*
 Randy L. Jirtle (1977), Ph.D., *Assistant Professor of Pathology*
 Frans F. Jöbsis (1964), Ph.D., *Professor of Physiology*
 Sheridan Johns III (1970), Ph.D., *Associate Professor of Political Science*
 Charles B. Johnson (1956), Ed.D., *Associate Professor of Education*
 Edward A. Johnson (1963), M.D., *James B. Duke Professor of Physiology*
 Thomas C. Johnson (1983), Ph.D., *Associate Professor of Geology*
 Stephen A. Johnston (1983), Ph.D., *Assistant Professor of Botany*
 William W. Johnston (1963), M.D., *Professor of Pathology*
 William Thomas Joines (1966), Ph.D., *Professor of Electrical Engineering*
 Wolfgang Karl Joklik (1968), D.Phil., *James B. Duke Professor of Microbiology and Immunology*
 Buford Jones (1962), Ph.D., *Associate Professor of English*
 Phillip L. Jones (1977), Ph.D., *Research Associate Professor of Materials Science*
 Henry Kamin (1948), Ph.D., *Professor of Biochemistry*
 Alice Yaeger Kaplan (1986), Ph.D., *Associate Professor of Romance Languages*
 Jeffrey A. Karson (1985), Ph.D., *Associate Professor of Geology*
 Bernard Kaufman (1968), Ph.D., *Associate Professor of Biochemistry*
 Russel Kaufman (1984), Ph.D., *Assistant Professor of Biochemistry*
 Richard F. Kay (1973), Ph.D., *Professor of Anatomy and Adjunct Associate Professor of Anthropology*
 Gershon Kedem (1985), Ph.D., *Associate Professor of Computer Science*
 Jack D. Keene (1979), Ph.D., *Associate Professor of Virology*
 Thomas F. Keller (1959), Ph.D., *R. J. Reynolds Industries Professor of Business Administration*
 Allen C. Kelley (1972), Ph.D., *James B. Duke Professor of Economics*

Alan C. Kerckhoff (1958), Ph.D., *Professor of Sociology*
 Robert B. Kerr (1965), Ph.D., *Professor of Electrical Engineering*
 Alexander Keyssar (1986), Ph.D., *Associate Professor of History*
 Clinton Donald Kilts (1981), Ph.D., *Assistant Professor of Pharmacology*
 Kent P. Kimbrough (1981), Ph.D., *Associate Professor of Economics*
 Norman Kirshner (1956), Ph.D., *Professor of Pharmacology*
 Naoki Kishimoto (1987), Ph.D., *Assistant Professor of Business Administration*
 Joseph Weston Kitchen, Jr. (1962), Ph.D., *Associate Professor of Mathematics*
 Herbert P. Kitschelt (1984), Ph.D., *Assistant Professor of Political Science*
 Gordon K. Klintworth (1964), M.D., Ph.D., *Professor of Pathology*
 Peter H. Klopfer (1958), Ph.D., *Professor of Zoology*
 Josiah Doss Knight (1985), Ph.D., *Assistant Professor of Mechanical Engineering*
 Kenneth R. Knoerr (1961), Ph.D., *Professor of Forest Meteorology and Associate Professor of Botany*
 John A. Koepke (1979), M.D., *Professor of Pathology*
 Bruce D. Kohorn (1986), Ph.D., *Assistant Professor of Botany*
 J. Mailen Kootsey (1971-76; 1979), Ph.D., *Associate Professor of Physiology and Research Associate Professor of Computer Science*
 Allan Kornberg (1965), Ph.D., *Professor of Political Science*
 Wesley A. Kort (1965), Ph.D., *Professor of Religion*
 David Paul Kraines (1970), Ph.D., *Associate Professor of Mathematics*
 Wilmer L. Kranich (1986), Ph.D., *Adjunct Professor of Civil and Environmental Engineering*
 Nicholas Michael Kredich (1968), M.D., *Professor of Biochemistry*
 Irwin Kremen (1963), Ph.D., *Assistant Professor of Psychology*
 Kenneth N. Kreuzer (1984), Ph.D., *Assistant Professor of Microbiology*
 William R. Krigbaum (1952), Ph.D., *James B. Duke Professor of Chemistry*
 Anne O. Krueger (1986), Ph.D., *Distinguished Professor of Economics*
 Magnus Jan Krynski (1966), Ph.D., *Professor of Slavic Languages and Literatures*
 Cynthia Moreton Kuhn (1978), Ph.D., *Associate Professor of Pharmacology*
 Bruce R. Kuniholm (1977), Ph.D., *Professor of Public Policy Studies and Professor of History*
 Thomas A. Kunkel (1986), Ph.D., *Adjunct Assistant Professor in the Genetics Program*
 Johannes A. Kylstra (1965), M.D., Ph.D., *Associate Professor of Physiology*
 Leon Lack (1965), Ph.D., *Professor of Pharmacology*
 Creighton Lacy (1953), Ph.D., *Professor of World Christianity*
 Helen F. Ladd (1986), Ph.D., *Professor of Public Policy Studies and Adjunct Professor of Economics*
 Martin Lakin (1958), Ph.D., *Professor of Psychology*
 Michael K. Lamvik (1982), Ph.D., *Assistant Professor of Anatomy*
 Kenneth C. Land (1985), Ph.D., *Professor of Sociology*
 Peter Lange (1982), Ph.D., *Associate Professor of Political Science*
 Thomas A. Langford (1956), Ph.D., *Professor of Systematic Theology*
 Daniel M. Lapadula (1981), Ph.D., *Assistant Medical Research Professor of Pharmacology*
 Dan Laughhunn (1968-75; 1976), D.B.A., *Professor of Business Administration*
 Cathy C. Laurie (1986), Ph.D., *Associate Professor of Zoology*
 Gregory F. Lawler (1979), Ph.D., *Associate Professor of Mathematics*
 Bruce B. Lawrence (1971), Ph.D., *Professor of Religion*
 Richard H. Leach (1955), Ph.D., *Professor of Political Science*
 Robert Lefkowitz (1973), M.D., *Professor of Biochemistry*
 Ann LeFurgey (1980), Ph.D., *Assistant Professor of Physiology*
 Frank Lentricchia (1984), Ph.D., *Professor of English*
 Warren Lerner (1961), Ph.D., *Professor of History*
 Arie Y. Lewin (1974), Ph.D., *Professor of Business Administration*
 Melvyn Lieberman (1968), Ph.D., *Professor of Physiology*
 Chia-Sheng Lin (1981), Ph.D., *Assistant Professor of Anatomy*
 C. Eric Lincoln (1976), Ph.D., *Professor of Sociology of Religion*
 Frederick W. Lindahl (1985), Ph.D., *Assistant Professor of Economics*
 Elwood A. Linney (1984), Ph.D., *Associate Professor of Microbiology and Immunology*
 Joseph Lipscomb, Jr. (1974), Ph.D., *Associate Professor of Public Policy Studies*
 Daniel A. Livingstone (1956), Ph.D., *James B. Duke Professor of Zoology*
 John E. Lochman (1984), Ph.D., *Adjunct Assistant Professor of Psychology*
 Charles H. Lochmüller (1969), Ph.D., *Professor of Chemistry and Professor of Biochemical Engineering*
 Gregory R. Lockhead (1965), Ph.D., *Professor of Psychology*
 Timothy J. Lomperis (1984), Ph.D., *Assistant Professor of Political Science*
 Charles Houston Long (1974), Ph.D., *Professor of Religion*
 William Longley (1968), Ph.D., *Associate Professor of Anatomy*
 Donald W. Loveland (1973), Ph.D., *Professor of Computer Science*
 John Charles Lucchesi (1980), Ph.D., *Adjunct Professor in the Genetics Program*

John G. Lundberg (1970), Ph.D., *Associate Professor of Zoology*
 John M. McCann (1978), Ph.D., *Associate Professor of Business Administration*
 Kevin F. McCardle (1985), Ph.D., *Assistant Professor of Business Administration*
 Kenneth S. McCarty (1959), Ph.D., *Professor of Biochemistry*
 Kenneth Scott McCarty, Jr. (1976), M.D., Ph.D., *Associate Professor of Pathology*
 David R. McClay (1973), Ph.D., *Professor of Zoology and Assistant Professor of Immunology*
 John B. McConahay (1974), Ph.D., *Associate Professor of Public Policy Studies*
 James H. McElhaney (1973), Ph.D., *Professor of Biomedical Engineering*
 Marjorie McElroy (1970), Ph.D., *Professor of Economics*
 Linda McGown (1987), Ph.D., *Associate Professor of Chemistry*
 Philip A. McHale (1972), Ph.D., *Adjunct Assistant Professor of Physiology*
 Thomas J. McIntosh (1977), Ph.D., *Associate Professor of Anatomy*
 Margaret A. McKean (1974), Ph.D., *Associate Professor of Political Science*
 Thomas J. McManus (1961), M.D., *Associate Professor of Physiology*
 James O. McNamara (1973), M.D., *Associate Professor of Pharmacology*
 Andrew T. McPhail (1968), Ph.D., *Professor of Chemistry*
 Richard A. MacPhail (1984), Ph.D., *Assistant Professor of Chemistry*
 Ross D. E. MacPhee (1979), Ph.D., *Associate Professor of Anatomy*
 George L. Maddox, Jr. (1960), Ph.D., *Professor of Sociology*
 Wesley A. Magat (1974), Ph.D., *Associate Professor in Fuqua School of Business and Associate Professor of Public Policy Studies*
 Lynn A. Maguire (1982), Ph.D., *Assistant Professor of Resource Ecology*
 Edward P. Mahoney (1965), Ph.D., *Professor of Philosophy*
 Terry Malone (1987), Ph.D., *Assistant Professor of Physical Therapy*
 Lazaro J. Mandel (1972), Ph.D., *Professor of Physiology*
 Kenneth G. Manton (1977), Ph.D., *Research Professor of Demographic Studies*
 Carlos M. Marin (1982), Ph.D., *Assistant Professor of Hydrology and Assistant Professor of Civil and Environmental Engineering*
 Peter N. Marinos (1968), Ph.D., *Professor of Electrical Engineering and Professor of Computer Science*
 George Marsden (1986), Ph.D., *Professor of the History of Christianity in America*
 Gail R. Marsh (1969), Ph.D., *Adjunct Assistant Professor of Psychology*
 Robert C. Marshall (1983), Ph.D., *Assistant Professor of Economics*
 Anne L. Martin (1984), Ph.D., *Assistant Professor of Health Administration*
 Hisham Z. Massoud (1983), Ph.D., *Associate Professor of Electrical Engineering*
 Seymour Mauskopf (1964), Ph.D., *Professor of History*
 Joseph B. Mazzola (1984), Ph.D., *Associate Professor of Business Administration*
 Miguel A. Medina, Jr. (1976), Ph.D., *Associate Professor of Civil and Environmental Engineering*
 Elgin W. Mellown, Jr. (1965), Ph.D., *Associate Professor of English*
 Robert J. Melosh (1978), Ph.D., *Professor of Civil Engineering*
 Daniel B. Menzel (1971), Ph.D., *Professor of Pharmacology*
 Richard S. Metzgar (1962), Ph.D., *Professor of Immunology*
 Michael J. Meurer (1985), Ph.D., *Assistant Professor of Economics*
 Johannes Horst Max Meyer (1959), Ph.D., *Professor of Physics*
 Carol L. Meyers (1979), Ph.D., *Associate Professor of Religion*
 Eric M. Meyers (1969), Ph.D., *Professor of Religion*
 George Michalopoulos (1977), M.D., Ph.D., *Professor of Pathology*
 Agnes K. L. Michels (1981), Ph.D., *Visiting Professor of Classical Studies*
 Martin Miller (1970), Ph.D., *Associate Professor of History*
 Sara Elizabeth Miller (1973), Ph.D., *Associate Medical Research Professor of Microbiology*
 Elliott Mills (1968), Ph.D., *Professor of Pharmacology and Associate Professor of Physiology*
 Brent Drennen Mishler (1984), Ph.D., *Assistant Professor of Botany*
 Thomas G. Mitchell (1974), Ph.D., *Associate Professor of Mycology*
 Paul L. Modrich (1976), Ph.D., *Professor of Biochemistry*
 Michael Moon (1987), Ph.D., *Assistant Professor of English*
 John Kevin Moore (1984), J.D., *Adjunct Assistant Professor of Health Administration*
 John W. Moore (1961), Ph.D., *Professor of Physiology*
 Lawrence C. Moore, Jr. (1966), Ph.D., *Associate Professor of Mathematics*
 Michael Moore (1984), Ph.D., *Assistant Professor of Business Administration*
 Richard C. Morey (1978), Ph.D., *Professor of the Practice of Management Sciences*
 David R. Morrison (1986), Ph.D., *Associate Professor of Mathematics*
 Michael M. Morton (1985), Ph.D., *Assistant Professor of German*
 Michael Moses (1987), Ph.D., *Assistant Professor of English*
 Montrose J. Moses (1959), Ph.D., *R. J. Reynolds Industries Professor in Medical Education in the Department of Anatomy*
 Valentim Mudimbe (1987), Ph.D., *Professor of Romance Languages*
 Bruce J. Muga (1967), Ph.D., *Professor of Civil Engineering*

George C. Myers (1968), Ph.D., *Professor of Sociology*
 Gopalan Nadathur (1986), *Assistant Professor of Computer Science*
 J. Victor Nadler (1978), Ph.D., *Associate Professor of Pharmacology*
 Dana W. Nance (1983), Ph.D., *Assistant Professor of Mathematics*
 Sydney Nathans (1966), Ph.D., *Associate Professor of History*
 Robert F. Nau (1985), Ph.D., *Assistant Professor of Business Administration*
 Thomas H. Naylor (1964), Ph.D., *Professor of Economics*
 David Needham (1987), Ph.D., *Assistant Professor of Mechanical Engineering*
 Charles B. Nemeroff (1983), Ph.D., *Associate Professor of Pharmacology*
 Kristen B. Neuschel (1982), Ph.D., *Assistant Professor of History*
 Joseph Nevins (1987), Ph.D., *Professor of Microbiology and Immunology*
 Francis Newton (1967), Ph.D., *Professor of Latin in Classical Studies*
 Robert Bruce Nicklas (1965), Ph.D., *Professor of Zoology and Professor of Anatomy*
 James Edward Nidel (1986), M.D., Ph.D., *Assistant Professor of Pharmacology*
 Frederik Nijhout (1977), Ph.D., *Associate Professor of Zoology*
 Mary M. Nijhout (1982), Ph.D., *Lecturer in Zoology*
 Loren W. Nolte (1966), Ph.D., *Professor of Electrical Engineering and Professor of Biomedical Engineering*
 Holger O. Nygard (1960), Ph.D., *Professor of English*
 John F. Oates (1967), Ph.D., *Professor of Ancient History in Classical Studies*
 Jean Fox O'Barr (1969), Ph.D., *Adjunct Associate Professor of Political Science*
 William M. O'Barr (1969), Ph.D., *Professor of Anthropology*
 Fearghus O'Foghludha (1975), Ph.D., *Adjunct Professor of Physics*
 Seog Hwan Oh (1984), Ph.D., *Assistant Professor of Physics*
 Angela O'Rand (1979), Ph.D., *Associate Professor of Sociology*
 Ram Oren (1986), Ph.D., *Assistant Professor of Forestry and Environmental Studies*
 Linda Orr (1980), Ph.D., *Associate Professor of Romance Languages*
 Robert T. Osborn (1954), Ph.D., *Professor of Religion*
 Charles Barry Osmond (1986), Ph.D., *Arts and Sciences Professor of Botany*
 Suydam Osterhout (1959), M.D., Ph.D., *Professor of Microbiology*
 Michael C. Ostrowski (1984), Ph.D., *Assistant Professor of Virology*
 Rafael Osuna (1977), Ph.D., *Professor of Romance Languages*
 Athos Ottolenghi (1959), M.D., *Professor of Pharmacology*
 George M. Padilla (1965), Ph.D., *Professor of Physiology*
 Ellis B. Page (1979), Ed.D., *Professor of Education*
 David L. Paletz (1967), Ph.D., *Professor of Political Science*
 Richard A. Palmer (1966), Ph.D., *Professor of Chemistry*
 Richard G. Palmer (1977), Ph.D., *Associate Professor of Physics*
 Erdman B. Palmore (1967), Ph.D., *Professor of Sociology*
 William Leslie Pardon (1977), Ph.D., *Associate Professor of Mathematics*
 Peter Parks (1987), Ph.D., *Assistant Professor of Forestry and Environmental Studies*
 Harry B. Partin (1964), Ph.D., *Associate Professor of Religion*
 Eric I. Pas (1980), Ph.D., *Research Associate Professor of Civil Engineering*
 Merrell Lee Patrick (1964), Ph.D., *Professor of Computer Science*
 Annabel M. Patterson (1986), Ph.D., *Professor of English*
 David T. Patterson (1980), Ph.D., *Adjunct Associate Professor of Botany*
 Lee Patterson (1986), Ph.D., *Professor of English*
 John W. Payne (1977), Ph.D., *Professor of Business Administration*
 William Bernard Peach (1951), Ph.D., *Professor of Philosophy*
 George Wilbur Pearsall (1964), Sc.D., *Professor of Mechanical Engineering and Materials Science and Professor of Public Policy Studies*
 J. Jeffrey Peirce (1981), Ph.D., *Associate Professor of Civil and Environmental Engineering*
 Gustavo F. Pérez (1978), Ph.D., *Associate Professor of Romance Languages*
 Ronald D. Perkins (1968), Ph.D., *Professor of Geology*
 Melvin K. H. Peters (1983), Ph.D., *Associate Professor of Religion*
 David West Peterson (1986), Ph.D., *Adjunct Professor of Business Administration*
 Henry J. Petroski (1980), Ph.D., *Associate Professor of Civil Engineering*
 Charles Pezeshki (1987), Ph.D., *Research Assistant Professor of Mechanical Engineering*
 Donna Rae Philbrick (1985), Ph.D., *Assistant Professor of Business Administration*
 David J. Pickup (1985), Ph.D., *Assistant Professor of Virology*
 Orrin Pilkey (1965), Ph.D., *James B. Duke Professor of Geology*
 Theo C. Pilkington (1961), Ph.D., *Professor of Biomedical Engineering and Professor of Electrical Engineering*
 David Stephen Pissetsky (1978), M.D., Ph.D., *Assistant Professor of Immunology*
 Salvatore V. Pizzo (1976), M.D., Ph.D., *Professor of Pathology*
 Robert Plonsey (1983), Ph.D., *Professor of Biomedical Engineering and Professor of Physiology*

Jacques C. Poirier (1955), Ph.D., *Professor of Chemistry*
 Richard P. Polniaszek (1986), Ph.D., *Assistant Professor of Chemistry*
 Deborah Pope (1979), Ph.D., *Associate Professor of English*
 Joseph A. Porter (1980), Ph.D., *Research Assistant Professor of English*
 Ned Allen Porter (1969), Ph.D., *James B. Duke Professor of Chemistry*
 Carl J. Posy (1981), Ph.D., *Associate Professor of Philosophy*
 William H. Poteat (1960), Ph.D., *Professor of Religion and Professor of Comparative Studies*
 Philip Pratt (1966), M.D., *Professor of Pathology*
 Vernon G. Pratt (1986), M.F.A., *Associate Professor of Art*
 David L. Presotto (1986), Ph.D., *Adjunct Assistant Professor of Computer Science*
 David Eugene Price (1973), Ph.D., *Professor of Political Science and Professor of Public Policy Studies*
 Reynolds Price (1958), D.Litt., *Professor of English*
 Stefan Pugh (1981), Ph.D., *Assistant Professor of Slavic Languages*
 Martha Putallaz (1983), Ph.D., *Assistant Professor of Psychology*
 Alicia Veronica Quinlan (1983), Ph.D., *Associate Professor of Mechanical Engineering and Associate Professor of Environmental Engineering*
 Naomi Quinn (1972), Ph.D., *Associate Professor of Anthropology*
 Denis Raczkowski (1986), Ph.D., *Assistant Medical Research Professor of Anatomy*
 K. V. Rajagopalan (1966), Ph.D., *Professor of Biochemistry*
 Dietolf Ramm (1971), Ph.D., *Research Associate Professor of Computer Science*
 Joseph S. Ramus (1978), Ph.D., *Professor of Botany*
 Dale B. J. Randall (1957), Ph.D., *Professor of English*
 Mark D. Rausher (1978), Ph.D., *Associate Professor of Zoology*
 Kenneth H. Reckhow (1980), Ph.D., *Associate Professor of Forestry and Environmental Studies and Associate Professor of Civil and Environmental Engineering*
 William M. Reddy (1977), Ph.D., *Associate Professor of History*
 Michael Charles Reed (1974), Ph.D., *Professor of Mathematics*
 Michael K. Reedy (1969), M.D., *Professor of Anatomy and Associate Professor of Physiology*
 William Reichert (1987), Ph.D., *Assistant Professor of Biomedical Engineering*
 John F. Reif (1986), Ph.D., *Professor of Computer Science*
 Keith Arnold Reimer (1975), M.D., Ph.D., *Associate Professor of Pathology*
 Michael A. Resnick (1985), Ph.D., *Adjunct Professor in the Genetics Program*
 Jacqueline A. Reynolds (1969), Ph.D., *Professor of Physiology*
 John F. Richards (1977), Ph.D., *Professor of History*
 Curtis J. Richardson (1977), Ph.D., *Associate Professor of Resource Ecology*
 David Claude Richardson (1969), Ph.D., *Associate Professor of Biochemistry*
 Jane Richardson (1970), M.A.T., *Associate Medical Research Professor of Biochemistry and Anatomy*
 Lawrence Richardson, Jr. (1966), Ph.D., *James B. Duke Professor of Latin in Classical Studies*
 Daniel Richter (1987), Ph.D., *Associate Professor of Forestry and Environmental Studies*
 William E. Ricks (1980), Ph.D., *Associate Professor of Business Administration*
 Stephen J. Riederer (1983), Ph.D., *Assistant Professor of Biomedical Engineering*
 Kent J. Rigsby (1971), Society of Fellows (Harvard), *Associate Professor of Classical Studies*
 Mary Ellen Riordan (1978), M.S., *Assistant Clinical Professor of Physical Therapy*
 Nathan Russell Roberson (1963), Ph.D., *Professor of Physics*
 Darryl Lamont Roberts (1984), Ph.D., *Assistant Professor of Political Science*
 J. David Robertson (1966), M.D., Ph.D., *James B. Duke Professor of Anatomy*
 Hugh G. Robinson (1964), Ph.D., *Professor of Physics*
 Sandra P. Robinson (1983), Ph.D., *Assistant Professor of Religion*
 Thomas Robisheaux (1984), Ph.D., *Assistant Professor of History*
 Herman R. Robl (1959-64; 1966), Ph.D., *Adjunct Professor of Physics*
 Marshall R. Roderick (1985), Ph.D., *Assistant Professor of Philosophy*
 Alex Roland (1981), Ph.D., *Associate Professor of History*
 James L. Rolleston (1975), Ph.D., *Associate Professor of Germanic Languages and Literature*
 Elaine Romanelli (1984), Ph.D., *Assistant Professor of Business Administration*
 Donald J. Rose (1984), Ph.D., *Professor of Computer Science and Professor of Mathematics*
 Gerald Martin Rosen (1972), Ph.D., *Associate Professor of Pharmacology*
 Arnold L. Rosenberg (1981), Ph.D., *Professor of Computer Science*
 Jonathan B. Rosenberg (1983), Ph.D., *Research Assistant Professor of Computer Science*
 Bruce R. Rosendahl (1976), Ph.D., *Associate Professor of Geology*
 Kathleen A. Ross (1984), Ph.D., *Assistant Professor of Romance Languages*
 Wendell F. Rosse (1966), M.D., *Professor of Immunology*
 Susan Roth (1973), Ph.D., *Associate Professor of Psychology*
 Virginia Louise Roth (1983), Ph.D., *Assistant Professor of Zoology*
 David C. Rubin (1978), Ph.D., *Professor of Psychology*
 Joan V. Ruderman (1986), Ph.D., *Associate Professor of Zoology*

Jeffrey Rummel (1986), Ph.D., Assistant Professor of Business Administration
 Clyde de Loache Ryals (1973), Ph.D., Professor of English
 Harvey J. Sage (1964), Ph.D., Associate Professor of Biochemistry and Associate Professor of Immunology
 Edward A. Saibel (1975), Ph.D., Adjunct Professor of Civil Engineering
 Alfred Paul Sanfilippo (1979), M.D., Ph.D., Associate Professor of Pathology
 David H. Sanford (1970), Ph.D., Professor of Philosophy
 Leslie D. Saper (1986), Ph.D., Assistant Professor of Mathematics
 Rakesh Sarin (1986), Ph.D., Professor of Business Administration
 Jack Murad Sasson (1983), Ph.D., Adjunct Professor in Religion
 Robert N. Sawyer (1976), Ed.D., Associate Professor of Education
 Frederick H. Schachat (1977), Ph.D., Assistant Professor of Anatomy
 David G. Schaeffer (1978), Ph.D., Professor of Mathematics
 Saul M. Schanberg (1967), M.D., Ph.D., Professor of Pharmacology
 Susan S. Schiffman (1972), Ph.D., Adjunct Professor of Psychology
 William H. Schlesinger (1980), Ph.D., Associate Professor of Botany
 David M. Schlossman (1985), M.D., Ph.D., Assistant Professor of Biochemistry
 Klaus Schmidt-Koenig (1983), Ph.D., Adjunct Professor of Zoology
 Chadmark L. Schoen (1982), Ph.D., Assistant Professor of Mathematics
 Stanley Clifford Schold, Jr. (1978), M.D., Assistant Professor of Pathology
 David W. Schomberg (1968), Ph.D., Associate Professor of Physiology
 Regina Schwartz (1987), Ph.D., Associate Professor of English
 Rochelle D. Schwartz (1986), Ph.D., Assistant Professor of Pharmacology
 Laura Schweitzer (1987), Ph.D., Assistant Medical Research Professor of Anatomy
 Anne Firor Scott (1961), Ph.D., William K. Boyd Professor of History
 William E. Scott (1958), Ph.D., Professor of History
 Richard A. Scoville (1961), Ph.D., Associate Professor of Mathematics
 Richard B. Searles (1965), Ph.D., Professor of Botany
 Tilman Seebass (1977), Ph.D., Associate Professor of Music
 Hilliard Foster Seigler (1967), M.D., Professor of Immunology
 Edward J. Shaughnessy, Jr. (1975), Ph.D., Professor of Mechanical Engineering
 Barbara Ramsay Shaw (1975), Ph.D., Associate Professor of Chemistry
 John Shelburne (1973), M.D., Ph.D., Professor of Pathology
 Marion L. Shepard (1967), Ph.D., Professor of Materials Science
 Blair H. Sheppard (1981), Ph.D., Associate Professor of Business Administration and Lecturer in Psychology
 Sudhir Shetty (1984), Ph.D., Assistant Professor of Public Policy Studies and Assistant Professor of Economics
 Joseph R. Shoenfield (1952), Ph.D., Professor of Mathematics
 Stephanie Sieburth (1987), Ph.D., Assistant Professor of Romance Languages
 James N. Siedow (1976), Ph.D., Professor of Botany
 Lewis M. Siegel (1968), Ph.D., Professor of Biochemistry
 Alexander Silbiger (1984), Ph.D., Professor of Music
 Sidney Arthur Simon (1974), Ph.D., Professor of Physiology
 Elwyn L. Simons (1977), Ph.D., D.Phil., James B. Duke Professor of Anthropology and Professor of Anatomy
 Ida Harper Simpson (1959), Ph.D., Professor of Sociology
 Kay H. Singer (1979), Ph.D., Assistant Medical Research Professor of Microbiology and Immunology
 Iqbal Singh (1987), Ph.D., Visiting Assistant Professor of Political Science
 William R. Sizemore (1982), Ph.D., Adjunct Professor of Forestry
 Theodore Alan Slotkin (1971), Ph.D., Professor of Pharmacology
 Carol A. Smith (1974), Ph.D., Associate Professor of Anthropology
 D. Moody Smith (1965), Ph.D., Professor of New Testament Interpretation
 David A. Smith (1962), Ph.D., Associate Professor of Mathematics
 Donald S. Smith II (1961), M.H.A., Assistant Professor of Health Administration
 Grover C. Smith (1952), Ph.D., Professor of English
 Harmon L. Smith (1959), Ph.D., Professor of Moral Theology
 Joel Smith (1958), Ph.D., Professor of Sociology
 Kathleen P. Smith (1980), Ph.D., Assistant Professor of Anatomy
 Peter Smith (1959), Ph.D., Professor of Chemistry
 Ralph Snyderman (1971), M.D., Professor of Immunology
 Helen Solterer (1986), Assistant Professor of Romance Languages
 George G. Somjen (1963), M.D., Professor of Physiology
 Joachim R. Sommer (1957), M.D., Professor of Pathology
 Madison S. Spach (1958), M.D., Professor of Physiology
 John R. Spencer (1978), Ph.D., Professor of Art History
 Kenneth I. Spenner (1984), Ph.D., Associate Professor of Sociology
 Leonard Spicer (1984), Ph.D., Professor of Biochemistry
 Thomas Arthur Spragens, Jr. (1967), Ph.D., Professor of Political Science

Carol B. Stack (1975), Ph.D., Associate Professor of Public Policy Studies and Adjunct Associate Professor of Anthropology
 John E. R. Staddon (1967), Ph.D., James B. Duke Professor of Psychology and Professor of Zoology
 Richard Staelin (1982), Ph.D., Edward and Rose Donnell Professor of Business Administration
 Dale O. Stahl II (1982), Ph.D., Assistant Professor of Economics
 William J. Stambaugh (1961), Ph.D., Professor of Forest Pathology
 Dennis Keith Stanley (1961), Ph.D., Associate Professor of Classical Studies
 Charles Franklin Starmer, Jr. (1966), Ph.D., Professor of Computer Science
 Deborah A. Steege (1977), Ph.D., Associate Professor of Biochemistry
 Harold K. Steen (1985), Ph.D., Adjunct Professor of Forestry and Environmental Studies
 David Curtis Steinmetz (1971), Th.D., Professor of Church History and Doctrine
 Jens A. Stephan (1984), Ph.D., Assistant Professor of Business Administration
 Mark Andrew Stern (1985), Ph.D., Assistant Professor of Mathematics
 Philip Stewart (1972), Ph.D., Professor of Romance Languages
 Donald E. Stone (1963), Ph.D., Professor of Botany
 Boyd R. Strain (1969), Ph.D., Professor of Botany
 Victor H. Strandberg (1966), Ph.D., Professor of English
 Harold Carl Strauss (1972), M.D., Professor of Pharmacology
 Richard A. Strelitz (1984), Ph.D., Assistant Professor of Geology
 Howard Austin Strobel (1948), Ph.D., Professor of Chemistry
 Norman C. Strole (1968), Ph.D., Adjunct Assistant Professor of Electrical Engineering
 Akio Sugino (1986), Ph.D., Adjunct Assistant Professor of Genetics
 Judy Sund (1986), Ph.D., Assistant Professor of Art History
 J. Bolling Sullivan (1970), Ph.D., Associate Professor of Biochemistry
 Kenneth Surin (1967), Ph.D., Professor of Religion
 John P. Sutherland (1969), Ph.D., Associate Professor of Zoology
 Judith Swain (1987), M.D., Assistant Professor of Physiology
 James A. Swenberg (1979), D.V.M., Ph.D., Adjunct Associate Professor of Pathology
 John Sylvester (1982), Ph.D., Assistant Professor of Mathematics
 Avis L. Sylvia (1977), Ph.D., Associate Medical Research Professor of Physiology
 Daniel B. Szlyd (1986), Ph.D., Professor of Computer Science
 Teh Yu Tan (1986), Ph.D., Professor of Materials Science
 Charles Tanford (1960), Ph.D., James B. Duke Professor of Physiology
 George E. Tauchen (1977), Ph.D., Associate Professor of Economics
 Trans-Son Tay (1987), Ph.D., Assistant Professor of Mechanical Engineering and Materials Science
 Kenneth Allen Taylor (1980), Ph.D., Associate Medical Research Professor of Anatomy
 Robert Taylor (1983), Ph.D., Professor of Health Administration
 John J. TePaske (1967), Ph.D., Professor of History
 Marcel Tetel (1960), Ph.D., Professor of Romance Languages
 John E. Thomas (1987), Ph.D., Associate Professor of Physics
 Jean-Jacques Thomas (1981), Doctorat de 3e Cycle, Associate Professor of Romance Languages
 Robert J. Thompson, Jr. (1984), Ph.D., Adjunct Professor of Psychology
 Fredrick L. Thurstone (1967), Ph.D., Professor of Biomedical Engineering
 Edward A. Tiryakian (1965), Ph.D., Professor of Sociology
 R. Larry Todd (1978), Ph.D., Associate Professor of Music
 Jane Tompkins (1985), Ph.D., Professor of English
 Robert E. Toomey (1980), LL.D., Adjunct Professor of Health Administration
 Marianna Torgovnick (1981), Ph.D., Professor of English
 Edward Tower (1974), Ph.D., Professor of Economics
 Gregg E. Trahey (1985), Ph.D., Assistant Professor of Biomedical Engineering
 Vladimir G. Trembl (1967), Ph.D., Professor of Economics
 Kishor S. Trivedi (1975), Ph.D., Professor of Computer Science and Professor of Electrical Engineering
 Michel-Rolph Trouillot (1984), Ph.D., Associate Professor of Anthropology
 George Truskey (1987), Ph.D., Assistant Professor of Biomedical Engineering
 Anne S. Tsui (1981), Ph.D., Associate Professor of Business Administration
 Vance Tucker (1964), Ph.D., Professor of Zoology
 Clare Tufts (1987), Ph.D., Assistant Professor of Romance Languages
 William Turner (1987), Ph.D., Assistant Professor of Religion
 E. Lee Tyrey (1970), Ph.D., Associate Professor of Anatomy
 Senol Utku (1970), Sc.D., Professor of Civil Engineering and Professor of Computer Science
 Marcy K. Uyenoyma (1982), Ph.D., Associate Professor of Zoology
 Arturo Valenzuela (1970), Ph.D., Professor of Political Science
 Stephanos Venakides (1986), Ph.D., Associate Professor of Mathematics
 John M. Vernon (1966), Ph.D., Professor of Economics
 P. Aarne Vesilind (1970), Ph.D., Professor of Civil and Environmental Engineering
 Dan O. Via, Jr. (1984), Ph.D., Professor of New Testament

Steven Vigna (1987), Ph.D., *Associate Professor of Physiology*
 Rytas J. Vilgalys (1986), Ph.D., *Assistant Professor of Botany*
 Elia E. Villanueva (1969), A.M., *Associate Professor of Physical Therapy*
 S. Viswanathan (1986), Ph.D., *Assistant Professor of Business Administration*
 F. Stephen Vogel (1961), M.D., *Professor of Pathology*
 Steven Vogel (1966), Ph.D., *Professor of Zoology*
 Robert C. Voight (1986), Ph.D., *Adjunct Professor of Computer Science*
 Robin T. Vollmer (1975), M.D., *Assistant Clinical Professor of Pathology*
 Olaf T. von Ramm (1974), Ph.D., *Professor of Biomedical Engineering*
 Robert A. Wagner (1978), Ph.D., *Associate Professor of Computer Science*
 Geoffrey Wainwright (1983), Dr.Théol., *Professor of Religion*
 Stephen A. Wainwright (1964), Ph.D., *James B. Duke Professor of Zoology*
 William D. Walker (1971), Ph.D., *Professor of Physics*
 Andrew G. Wallace (1964), M.D., *Assistant Professor of Physiology*
 T. Dudley Wallace (1974), Ph.D., *James B. Duke Professor of Economics*
 Lise Wallach (1970), Ph.D., *Adjunct Professor of Psychology*
 Michael A. Wallach (1962-72; 1973), Ph.D., *Professor of Psychology*
 Richard L. Walter (1962), Ph.D., *Professor of Physics*
 Paul P. Wang (1968), Ph.D., *Professor of Electrical Engineering*
 Calvin L. Ward (1952), Ph.D., *Professor of Zoology*
 Frances Ellen Ward (1969), Ph.D., *Professor of Immunology*
 Bruce W. Wardropper (1962), Ph.D., *William Hanes Wannamaker Professor of Romance Languages*
 Seth L. Warner (1955), Ph.D., *Professor of Mathematics*
 David Grant Warren (1975), J.D., *Professor of Health Administration*
 W. David Watkins (1984), M.D., Ph.D., *Professor of Pharmacology*
 Katharine Way (1968), Ph.D., *Adjunct Professor of Physics*
 Robert E. Webster (1970), Ph.D., *Professor of Biochemistry*
 Andrew S. Wechsler (1974), M.D., *Assistant Professor of Physiology*
 E. Roy Weintraub (1970), Ph.D., *Professor of Economics*
 Morris Weisfeld (1967), Ph.D., *Professor of Mathematics*
 Jay M. Weiss (1984), Ph.D., *Adjunct Professor of Psychology*
 Henry R. Weller (1978), Ph.D., *Professor of Physics*
 Robert P. Weller (1980), Ph.D., *Assistant Professor of Anthropology*
 Richard L. Wells (1962), Ph.D., *Professor of Chemistry*
 Robert E. Whaley (1986), Ph.D., *Associate Professor of Business Administration*
 Annabel Wharton (1979), Ph.D., *Associate Professor of Art*
 Robert W. Wheat (1958), Ph.D., *Professor of Microbiology*
 Richard A. White (1963), Ph.D., *Professor of Botany*
 Richard Whorton (1979), Ph.D., *Associate Professor of Pharmacology*
 Jennifer Widner (1986), Ph.D., *Assistant Professor of Political Science*
 Carol J. Wikstrand (1975), Ph.D., *Assistant Medical Research Professor of Pathology*
 Henry M. Wilbur (1973), Ph.D., *Professor of Zoology*
 Robert L. Wilbur (1957), Ph.D., *Professor of Botany*
 Pelham Wilder, Jr. (1949), Ph.D., *Professor of Chemistry and Professor of Pharmacology*
 Hilda Pope Willett (1948), Ph.D., *Professor of Microbiology*
 George W. Williams (1957), Ph.D., *Professor of English*
 Kenny J. Williams (1977), Ph.D., *Professor of English*
 Peter Fredric Williams (1985), Ph.D., *Professor of Music*
 Robert Sanders Williams (1987), M.D., *Assistant Professor of Physics*
 James F. Wilson (1967), Ph.D., *Professor of Civil Engineering*
 John Wilson (1968), D.Phil., *Associate Professor of Sociology*
 Thomas George Wilson (1959), Sc.D., *Professor of Electrical Engineering*
 Wilkie Andrew Wilson, Jr. (1974), Ph.D., *Associate Medical Research Professor of Pharmacology*
 Robert G. Winfree (1974), M.A., *Adjunct Associate Professor of Health Administration*
 Cliff W. Wing, Jr. (1965), Ph.D., *Professor of Psychology*
 Robert L. Winkler (1984), Ph.D., *Professor of Business Administration*
 Orval S. Wintermute (1958), Ph.D., *Professor of Religion*
 Ronald Witt (1971), Ph.D., *Professor of History*
 Benjamin Wittels (1961), M.D., *Professor of Pathology*
 Myron L. Wolbarsht (1968), Ph.D., *Professor of Biomedical Engineering and Associate Professor of Physiology*
 Robert L. Wolpert (1984), Ph.D., *Research Associate Professor*
 Ronald C. Wong (1985), Ph.D., *Assistant Professor of Electrical Engineering*
 Peter H. Wood (1975), Ph.D., *Associate Professor of History*
 Donald Wright (1967), Ph.D., *Associate Professor of Mechanical Engineering*

Patricia Chapple Wright (1983), Ph.D., *Assistant Professor of Anthropology*
 Duncan Yaggy (1980), Ph.D., *Professor of Public Management in Public Policy Studies and Adjunct Assistant Professor of Health Administration*
 William E. Yarger (1971), M.D., *Assistant Professor of Physiology*
 William P. Yohe (1958), Ph.D., *Professor of Economics*
 Charles R. Young (1954), Ph.D., *Professor of History*
 John G. Younger (1974), Ph.D., *Professor of Classical Studies*
 Allen Zagarell (1980), Ph.D., *Assistant Professor of Anthropology*
 Michael Rod Zalutsky (1986), Ph.D. *Assistant Professor of Pathology*
 Gary A. Zarkin (1982), Ph.D., *Assistant Professor of Economics*
 Peter Zwadyk, Jr. (1971), Ph.D., *Associate Professor of Pathology*

Emeritus Professors

John Richard Alden (1955), Ph.D., *James B. Duke Professor Emeritus of History*
 Lewis Edward Anderson (1936), Ph.D., *Professor Emeritus of Botany*
 Roger Fabian Anderson (1950), Ph.D., *Professor Emeritus of Entomology*
 Joseph Randle Bailey (1946), Ph.D., *Professor Emeritus of Zoology*
 Frank Baker (1960), Ph.D., *Professor Emeritus of English Church History*
 M. Margaret Ball (1963), Ph.D., *Professor Emeritus of Political Science*
 Katharine May Banham (1946), Ph.D., *Associate Professor Emeritus of Psychology*
 William Waldo Beach, (1946), Ph.D., *Professor Emeritus of Christian Ethics*
 Frederick Bernheim (1930), Ph.D., *James B. Duke Professor Emeritus of Pharmacology*
 Mary L. C. Bernheim (1930), Ph.D., *Professor Emeritus of Biochemistry*
 William Dwight Billings (1952), Ph.D., *James B. Duke Professor Emeritus of Botany*
 Cazlyn Green Bookhout (1935), Ph.D., *Professor Emeritus of Zoology*
 Benjamin Boyce (1950), Ph.D., *James B. Duke Professor Emeritus of English*
 Charles Kilgo Bradsher (1939), Ph.D., *James B. Duke Professor Emeritus of Chemistry*
 Martin Bronfenbrenner (1971), Ph.D., *William R. Kenan, Jr. Professor Emeritus of Economics*
 Earl Ivan Brown II (1960), Ph.D., *J. A. Jones Professor Emeritus of Civil Engineering*
 Frances Campbell Brown (1931), Ph.D., *Professor Emeritus of Chemistry*
 Edwin H. Cady (1973), Ph.D., *Andrew W. Mellon Professor Emeritus in the Humanities*
 Leonard Carlitz (1932), Ph.D., *James B. Duke Professor Emeritus of Mathematics*
 William H. Cartwright (1951), Ph.D., *Professor Emeritus of Education*
 Frederic N. Cleaveland (1971), Ph.D., *Professor Emeritus of Political Science*
 Robert Taylor Cole (1935), Ph.D., *James B. Duke Research Professor Emeritus of Political Science*
 Robert Merle Colver (1953), Ed.D., *Associate Professor Emeritus of Education*
 Bingham Dai (1943), Ph.D., *Professor Emeritus of Psychology*
 William D. Davies (1966), D.D., *FB A., George Washington Ivey Professor Emeritus of Advanced Studies and Research in Christian Origins*
 Neal Dow (1934), Ph.D., *Professor Emeritus of Romance Languages*
 Francis George Dressel (1929), Ph.D., *Professor Emeritus of Mathematics*
 Kenneth Lindsay Duke (1940), Ph.D., *Associate Professor Emeritus of Anatomy*
 Howard Easley (1930), Ph.D., *Associate Professor Emeritus of Education*
 William Whitfield Elliott (1925), Ph.D., *Professor Emeritus of Mathematics*
 Ernest Elsevier (1950), M.S., *Associate Professor Emeritus of Mechanical Engineering*
 John Wendell Everett (1932), Ph.D., *Professor Emeritus of Anatomy*
 Arthur Bowles Ferguson (1939), Ph.D., *Professor Emeritus of History*
 Wallace Fowlie (1964), Ph.D., *James B. Duke Professor Emeritus of Romance Languages*
 John Hope Franklin (1981), Ph.D., *James B. Duke Professor Emeritus of History*
 Ernestine Friedl (1973), Ph.D., *James B. Duke Professor Emeritus of Anthropology*
 William J. Furbish (1954), M.S., *Associate Professor Emeritus of Geology*
 W. Scott Gehman, Jr. (1954), Ph.D., *Professor Emeritus of Psychology in Education*
 Clarence Gohdes (1930), Ph.D., *James B. Duke Professor Emeritus of English*
 Walter Gordy (1946), Ph.D., *James B. Duke Professor Emeritus of Physics*
 John R. Gregg (1957), Ph.D., *Professor Emeritus of Zoology*
 Kazimierz Grzybowski (1967), S.J.D., *Professor Emeritus of Political Science*
 Hugh Marshall Hall, Jr. (1952), Ph.D., *Professor Emeritus of Political Science*
 Louise Hall (1931), Ph.D., *Professor Emeritus of Architecture*
 John Hamilton Hallowell (1942), Ph.D., *James B. Duke Professor Emeritus of Political Science*
 Jerome S. Harris (1936), M.D., *Professor Emeritus of Biochemistry*
 William S. Heckscher (1966), Ph.D., *Benjamin N. Duke Professor Emeritus of Art*

Henry Hellmers (1965), Ph.D., *Professor Emeritus of Botany and Professor Emeritus of Forestry*
 Stuart C. Henry (1959), Ph.D., *Professor Emeritus of American Christianity*
 Marcus Edwin Hobbs (1935), Ph.D., *University Distinguished Service Professor Emeritus of Chemistry*
 Everett H. Hopkins (1961), M.A., LL.D., *Professor Emeritus of Education*
 Wanda S. Hunter (1947), Ph.D., *Associate Professor Emeritus of Zoology*
 Allan S. Hurlburt (1956), Ph.D., *Professor Emeritus of Education*
 Marianna Jenkins (1948), Ph.D., *Professor Emeritus of Art*
 Bronislas de Leval Jeziarski (1958), Ph.D., *Associate Professor Emeritus of Slavic Languages and Literatures*
 Terry W. Johnson, Jr. (1954), Ph.D., *Professor Emeritus of Botany*
 Brady Rimbey Jordan (1927), Ph.D., *Professor Emeritus of Romance Languages*
 Helen L. Kaiser (1943), R.P.T., *Professor Emeritus of Physical Therapy*
 Gregory A. Kimble (1952-68; 1977), Ph.D., *Professor Emeritus of Psychology*
 Paul Jackson Kramer (1931), Ph.D., *James B. Duke Professor Emeritus of Botany*
 Wladyslaw W. Kulski (1963), Ph.D., LL.D., *James B. Duke Professor Emeritus of Russian Affairs*
 Weston LaBarre (1946), Ph.D., *James B. Duke Professor Emeritus of Anthropology*
 Harold Walter Lewis (1946), Ph.D., *University Distinguished Service Professor Emeritus of Physics*
 H. Gregg Lewis (1975), Ph.D., *Professor Emeritus of Economics*
 John L. Lievsay (1962), Ph.D., *James B. Duke Professor Emeritus of English*
 L. Sigfred Linderoth, Jr. (1965), M.E., *Professor Emeritus of Mechanical Engineering*
 John C. McKinney (1957), Ph.D., *Professor Emeritus of Sociology*
 John Nelson Macduff (1956), M.M.E., *Professor Emeritus of Mechanical Engineering*
 Sidney David Markman (1947), Ph.D., *Professor Emeritus of Art History and Professor Emeritus of Archaeology*
 Earl George Mueller (1945), Ph.D., *Professor Emeritus of Art*
 Roland E. Murphy (1967-68; 1971), S.T.D., *George Washington Ivey Professor Emeritus of Old Testament*
 Francis Joseph Murray (1960), Ph.D., *Professor Emeritus of Mathematics*
 Aubrey Willard Naylor (1952), Ph.D., *James B. Duke Professor Emeritus of Botany*
 Yasuhiko Nozaki (1966), Ph.D., *Associate Professor Emeritus in Biochemistry*
 James G. Osborne (1961), B.S., *Professor Emeritus of Forest Biometry*
 Harry Ashton Owen, Jr. (1951), Ph.D., *Professor Emeritus of Electrical Engineering*
 Harold Talbot Parker (1939), Ph.D., *Professor Emeritus of History*
 Lewis Patton (1926), Ph.D., *Professor Emeritus of English*
 Ray C. Petry (1937), Ph.D., LL.D., *James B. Duke Professor Emeritus of Church History*
 Olan Lee Petty (1952), Ph.D., *Professor Emeritus of Education*
 Leland R. Phelps (1961), Ph.D., *Professor Emeritus of Germanic Languages and Literature*
 Jane Philpott (1951), Ph.D., *Professor Emeritus of Botany and Professor Emeritus of Wood Anatomy*
 Jack J. Preiss (1959), Ph.D., *Professor Emeritus of Sociology*
 Richard A. Preston (1965), Ph.D., *William K. Boyd Professor Emeritus of History*
 James Ligon Price, Jr. (1952), *Professor Emeritus of Religion*
 Louis DuBose Quin (1957), Ph.D., *James B. Duke Professor Emeritus of Chemistry*
 Theodore Ropp (1938), Ph.D., *Professor Emeritus of History*
 Mabel F. Rudisill (1948), Ph.D., *Associate Professor Emeritus of Education*
 Charles Richard Sanders (1937), Ph.D., *Professor Emeritus of English*
 Lloyd Saville (1946), Ph.D., *Professor Emeritus of Economics*
 Harold Schiffman (1963), Ph.D., *Professor Emeritus of Psychology*
 Knut Schmidt-Nielsen (1952), Ph.D., *Professor Emeritus of Physiology and Zoology*
 William H. Simpson (1930), Ph.D., *Professor Emeritus of Political Science*
 Joseph John Spengler (1934), Ph.D., *James B. Duke Professor Emeritus of Economics*
 William Franklin Stinespring (1936), Ph.D., *Professor Emeritus of Old Testament and Semitics*
 W. A. Stumpf (1948), Ph.D., *Professor Emeritus of Education*
 Elizabeth Read Sunderland (1939-42; 1943), Ph.D., *Professor Emeritus of Art*
 Edgar Tristram Thompson (1935), Ph.D., *Professor Emeritus of Sociology*
 James Nardin Truesdale (1930), Ph.D., *Professor Emeritus of Greek*
 Richard L. Tuthill (1953), Ed.D., *Professor Emeritus of Economic Geography*
 Patrick R. Vincent (1954), Ph.D., *Associate Professor Emeritus of Romance Languages*
 Warren Chase Vosburgh (1928), Ph.D., *Professor Emeritus of Chemistry*
 Richard Lyness Watson, Jr. (1939), Ph.D., *Professor Emeritus of History*
 Henry Weitz (1950), Ed.D., *Professor Emeritus of Education*
 Bruce A. Wells (1964), M.S.E.E., *Associate Professor Emeritus of Electrical Engineering*
 Paul Welsh (1948), Ph.D., *Professor Emeritus of Philosophy*
 Karl Milton Wilbur (1946), Ph.D., *James B. Duke Professor Emeritus of Zoology*
 William Hailey Willis (1963), Ph.D., *Professor Emeritus of Greek in Classical Studies*
 Max A. Woodbury (1966), Ph.D., *Professor Emeritus of Computer Science*
 Robert Hilliard Woody (1929), Ph.D., *Professor Emeritus of History*
 James G. Yoho (1984), Ph.D., *Research Professor Emeritus of Forest Investment*
 Franklin W. Young (1944-50; 1968), *Amos Ragan Kearns Professor Emeritus of New Testament and Patristic Studies*

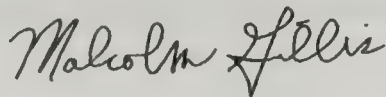
To the Prospective Graduate Student

A Graduate School is where excellence is established in a university. At Duke, the Graduate School is where the two essential functions of a university, teaching and research, truly come together. Over the years Duke's strength at the graduate level has grown in all the main fields of knowledge. The nineteen-eighties have been particularly fruitful years for recruitment of faculty, establishment of new programs, and attraction of outstanding students. The faculty enjoys international distinction. The laboratories, libraries, and computer facilities are among the very best. Yet the Graduate School remains small enough so that personal contact is a central feature of our programs, and fruitful interaction across disciplines is a common experience, both for faculty and students.

For the student in search of a strong graduate education, Duke University has much to offer. This is a community in which minds and ideas grow. We provide training for many careers, but we seek also to foster personal creativity and to provide stimulating yet congenial surroundings for productive education and research.

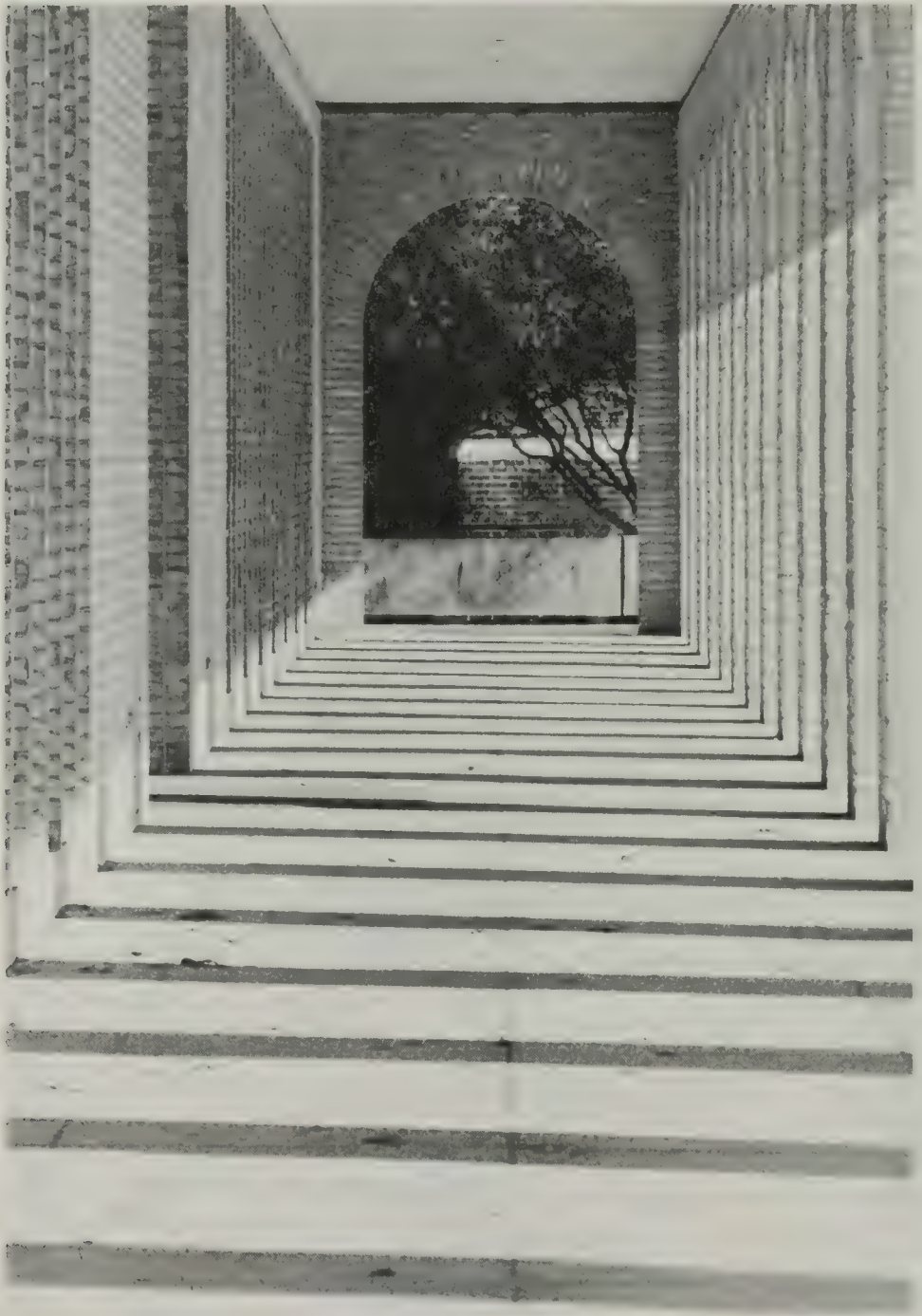
The following pages provide the information you require in making the important choice of the course of your graduate education. We look forward to welcoming you to the Duke community of scholars.

Malcolm Gillis

A handwritten signature in black ink that reads "Malcolm Gillis". The script is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

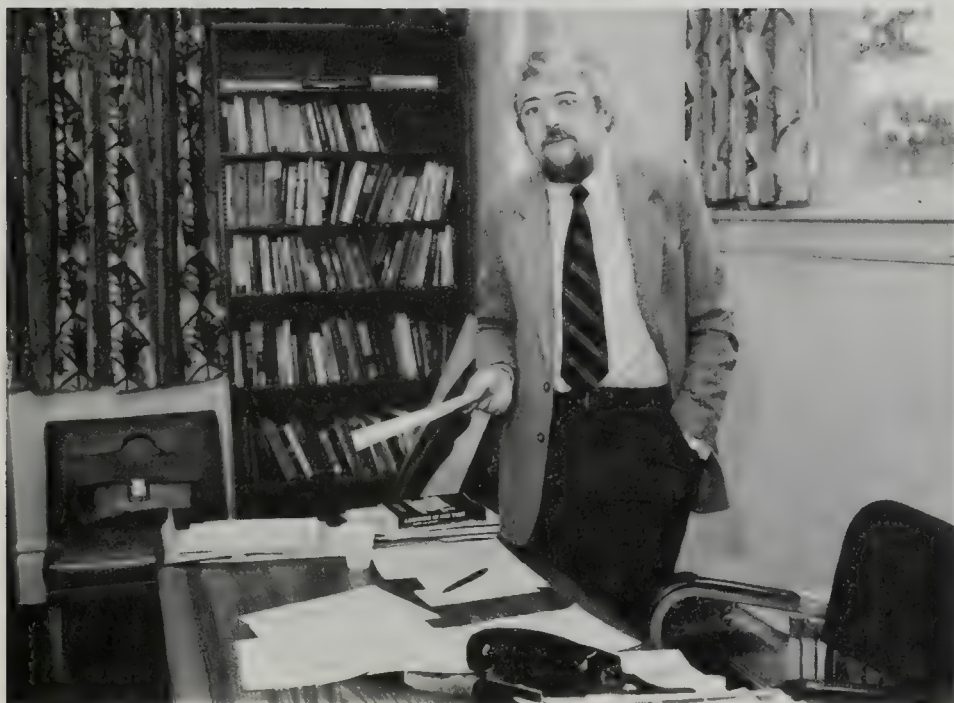
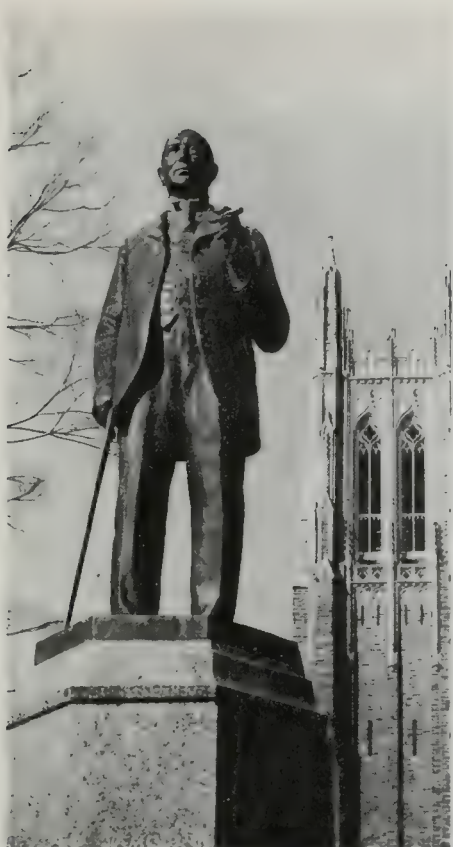
Dean of the Graduate School

Academic and Cooperative Programs



Department or Program	Degrees Offered	Page
Anatomy	Ph.D.	59
Anthropology	Ph.D.	62
Art and Art History	A.M.	64
Asian-Pacific Studies	—	66
Biochemistry	Ph.D.	66
Botany	A.M., M.S., Ph.D.	68
Business Administration	Ph.D.	72
Canadian Studies	—	189
Cell and Molecular Biology	—	74
Chemistry	Ph.D.	75
Classical Studies	Ph.D.	77
Computer Science	M.S., Ph.D.	80
Economics	A.M., Ph.D.	84
Education	—	89
Engineering:		
Biomedical	M.S., Ph.D.	91
Civil and Environmental	M.S., Ph.D.	93
Electrical	M.S., Ph.D.	98
Mechanical and Materials Science	M.S., Ph.D.	102
English	A.M., Ph.D.	106
Forestry	A.M., M.S., Ph.D.	109
Genetics	—	115
Geology	M.S., Ph.D.	116
German	A.M.	118
Health Administration	M.H.A.	120
History	A.M., Ph.D.	121
Humanities	A.M.	125
Islamic and Arabian Studies	—	191
Latin American Studies	—	191
Liberal Studies	A.M.	125
Literature	Ph.D.	126
Marine Sciences	—	127
Mathematics	A.M., M.S., Ph.D.	130
Medical History	—	191
Medical Science	—	193
Medieval and Renaissance Studies	—	133

Department or Program	Degrees Offered	Page
Microbiology and Immunology	Ph.D.	135
Music	A.M., Ph.D.	137
Neurobiology	—	139
Pathology	M.S., Ph.D.	140
Pharmacology	Ph.D.	142
Philosophy	A.M., Ph.D.	144
Physical Therapy	M.S.	146
Physics	Ph.D.	148
Physiology	Ph.D.	151
Political Science	A.M., Ph.D.	153
Psychology	Ph.D.	159
Public Policy Studies	A.M.	162
Religion	A.M., Ph.D.	167
Romance Languages	A.M., Ph.D.	174
Slavic Languages and Literatures	—	177
Sociology	A.M., Ph.D.	178
Toxicology	—	181
Women's Studies	—	182
Zoology	Ph.D.	183



Admission



Degree and Nondegree Admission

All students seeking a graduate degree from Duke University must formally be admitted to the Graduate School. Prerequisites for admission include a bachelor's degree (or the equivalent) from an accredited institution and satisfactory scores on the Graduate Record Examination. Individual departments may specify additional prerequisites, which can be found in the chapter on "Courses of Instruction."

Students who do not intend to earn an advanced degree at Duke, but who wish to take graduate courses, may apply for nondegree admission. Such admission is granted in three different categories (1) admission as a regular nondegree student with a particular department; (2) admission as a special nondegree student without departmental affiliation through the Office of Continuing Education; and (3) admission as an unclassified student in the summer session only.

Credits earned by nondegree students in graduate courses taken at Duke before full admission to the Graduate School may be carried over into a graduate degree program if (1) the action is recommended by the student's Director of Graduate Studies and approved by the Dean, (2) the work is not more than two years old, (3) the amount of such credit does not exceed 12 units, and (4) the work has received grades of G or better.

Students who have discontinued a program of degree work at Duke must apply for readmission to the Graduate School. Those who discontinue study *prior* to completing a degree must, by letter, request permission of the Dean to be readmitted to the degree program; those who discontinue study *after* earning a master's degree must file a new application for the doctoral program.

Admission Procedures*

A student seeking admission to the Graduate School should obtain an application packet from the Graduate School Admissions Office. This packet contains the necessary forms and detailed instructions on how to apply. The application form and accompanying Summary Data sheet must be filled out completely, signed, and returned to the Graduate Admissions Office accompanied by a nonrefundable fee of \$45† in U.S. currency (check or money order payable to Duke University). In addition, the student must provide the following supporting documents: (1) two copies of the official, confidential transcript from each postsecondary institution attended, sent directly to the Graduate

*This chapter is a brief summary of, and supplement to, information contained in the current Graduate School "Information for Applicants" booklet. This booklet is part of a standard application packet, which should be consulted for more comprehensive information on all aspects of the process of applying for admission and award.

†All fees are based on current charges and are subject to change without notice.



School by the institution; (2) three letters of evaluation, written on the forms provided and returned by the applicant in the confidential envelopes that have been sealed-then-signed by the evaluators (or returned directly to the Graduate School by the evaluator); (3) official scores on the Graduate Record Examination General Test for applicants to all departments; and (4) official scores on the Graduate Record Examination Subject Test for applicants to certain specified departments. Please consult the current application packet for more detailed information on all requirements.

Applications cannot be reviewed until all supporting documents are on file. *Materials submitted in support of an application are not released for other purposes and cannot be returned to the applicant.*

Students applying for fall admission and award should take the Graduate Record Examination no later than the October testing in the previous year in order to meet our deadlines. Information on the times and places of the Graduate Record Examinations can be obtained from the applicant's college or the Educational Testing Service, CN 6000, Princeton, New Jersey 08541-6000.

Additional Procedures for Foreign Students. Fully qualified students from outside the United States are invited to apply for admission to full-time study in the Graduate School. The foreign student must, in addition to the information required of all students, submit with the application materials: (1) if the student's native language is not English, certification of English proficiency demonstrated by official scores from the Test of English as a Foreign Language (TOEFL), administered through the Educational Testing Service, CN 6155, Princeton, New Jersey, 08541-6155 (the Graduate School requires a minimum score of 550); and (2) a statement showing financial arrangements for the proposed term at Duke (estimated costs per calendar year are about \$18,500).*

During new matriculants' first registration period at Duke, every foreign student whose native language is not English will be required to take a test to verify competence in the use of oral and written English. Until such competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack necessary competence should be prepared to undertake additional English language instruction. Students who do not perform satisfactorily on the competency test by the end of their first year of residency will not be permitted to continue graduate work at Duke University. Please note that the competency test does not take the place of the TOEFL 550 requirement, nor does passing the competency examination meet degree requirements for a foreign language.

Part-Time Graduate Study. Many graduate departments will consider applications from students wishing to pursue degree study on a full-time or part-time basis. (Consult application materials for listing of departments.) Admission requirements, procedures, and deadlines are the same in either case. See the chapter on "Registration" for additional rules governing minimum registration, time limitations, and financial aid restrictions on part-time study. *Visa restrictions do not allow nonimmigrant students to pursue graduate study on a part-time basis.*

Master of Arts in Liberal Studies Procedures. Students seeking admission to the MALS should contact that program directly for information, requirements, and special application materials.

Summer Session Procedures. Students who wish to begin graduate work during the summer must, in addition to applying for regular admission to the Graduate School, apply for admission to the summer session. Application forms may be obtained from Summer Session, 121 Allen Building, Duke University, Durham, North Carolina 27706, and may be submitted at the time of registration.

*Figures are based on 1987-88 charges and are subject to change before the fall 1988 semester.



Students who wish to take graduate courses in the summer but not pursue a graduate degree may be admitted to the summer session under the following categories. *Duke Students*: current students in good standing may attend the summer session without formal application. *Non-Duke Students*: other persons may seek admission to the summer session provided they are (or were) in good standing at a fully accredited college or university.

Continuing Education Procedures. A student seeking admission as a nondegree continuing education graduate student at Duke must have received a bachelor's degree and must either reside in the area or be moving to the area with the intention of residing here for a substantial period of time. Application materials and additional information may be obtained from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708.

Review of Application and Notification of Status. All applications are considered without regard to race, color, religion, sex, age, handicap, or national origin.

Application files are assembled in the Graduate Admissions Office, where all official record-keeping is maintained. Applications, when complete, are sent to the departments. A departmental admissions committee, usually headed by the Director of

Graduate Studies, reviews the applications and makes recommendations to the Dean. Formal admission to the Graduate School is offered only by the Dean, who will contact students in writing. An admission offer is only for the semester specified in the letter of admission, and admission may not be deferred automatically from one term to another.

Immunizations. North Carolina Statute G.S.: 130A-155.1 states that no person shall attend a college or university, public, private, or religious, excluding students attending night classes only and students matriculating in off-campus courses, unless a certificate of immunizations against diphtheria, tetanus, whooping cough, poliomyelitis, red measles (rubeola), and rubella is presented to the college or university on or before the first day of matriculation. The required forms and instructions are provided to students in the packet of materials sent with the letter of admission.

Deadlines for Application

It is the applicant's responsibility to make certain that the Graduate School office has received all required materials before the specified deadlines. Only complete applications can be considered. To ensure that the admissions office will have adequate time to assemble all items submitted on an applicant's behalf, applications should be sent *at least two weeks before the stated deadlines*.

Consult current application materials for a more detailed explanation of deadlines and their enforcement.

FOR FALL SEMESTER

January 13, 5:00 P.M. Deadline for *completion* of applications to programs in computer science, history, physical therapy, and psychology for fall 1989.

January 31, 5:00 P.M. Deadline for *completion* of applications for admission and award to all other programs for the fall 1989 semester.

January 13/31 are **Priority Filing Dates**. Applications received *and* completed by this date (depending on the program) are guaranteed a review; those received/completed after this date are not guaranteed consideration. Late applications may be considered for admission, only if all spaces have not been filled, and for financial aid, only if funds are still available.

All students seeking fall admission should complete their applications by the Priority Filing Date, since it is likely that enrollment in many departments will be filled soon after this date. Applications which are incomplete on January 13/31 cannot be considered for awards until decisions have been made on all complete applications.

The final cut-off date for processing new applications is July 15. Few departments, however, continue to review applications this late. No applications for fall received after this date will be processed.

FOR SPRING SEMESTER

November 1. Final date for completion of applications for admission to the spring semester, space permitting. Not all departments accept new students for the spring semester, nor is financial aid readily available for spring matriculants.

FOR SUMMER SESSION

Students seeking admission to the Graduate School for study in the summer session should apply to the Dean of the Graduate School and to the Director of the Summer Session.

April 15. Last day for completing application to summer session Term I.

May 15. Last day for completing application to summer session Term II.

Financial Information



Tuition and Fees*

STUDENTS ENROLLING FALL SEMESTER 1988

The 1988-89 tuition for new students enrolling full-time during the fall semester (except those students in health administration and physical therapy) is \$3,600 (12 units at \$300 per unit) or \$2,700 (9 units at \$300 per unit) for teaching and research assistants. In addition to tuition a registration fee of \$300 (not applicable for students who matriculated before fall semester 1985) is required each semester. Part-time tuition is calculated at the rate of \$300 per unit in the fall, spring, and summer.

Payment of Accounts. Duke University does not have a deferred payment plan for tuition, fees, or other charges. New students are expected to pay tuition and fees at the time of matriculation. Following first enrollment in the Graduate School, monthly invoices are sent each student by the Bursar's office. As a part of the agreement of admission to Duke University a student is required to pay all invoices upon receipt.

Graduate students who receive payments from the University for fellowships, assistantships, or employment and who plan to pay tuition and fees and/or campus housing charges via payroll deduction must make arrangements for payroll deduction in the Bursar's office by the published deadline for each semester in order to avoid assessment of the late payment charge.

All full-time graduate students and part-time degree candidates are charged the student health fee as well as student accident and sickness insurance coverage unless they file properly completed and signed insurance waivers in the Bursar's office by the invoice date. Students registered *in absentia* are not charged the health fee and insurance unless they elect to enroll in the insurance plan. *The student accident and sickness insurance payment is due in full at the beginning of the term (insurance may not be paid by payroll deduction). Payment in full for campus housing is due at the beginning of each semester unless the student qualifies for University payroll deduction.*

Late Payment Charge. A late registration fee of \$25 is charged any student who does not complete registration during the announced registration periods. Students who fail to pay by the due date the total amount of an invoice received from the Bursar will be charged a late payment fee. That fee is assessed at the rate of 1½ percent per month (16 percent per year) applied to the past due balance and accrued from the billing date of the invoice (matriculation date for new students).

*All fees are based on current charges and are subject to change without notice.

Restrictions. A student in default on tuition or fee charges will not be allowed to register for classes, receive a transcript of academic records, have academic credits certified, be granted a leave of absence, or receive a diploma at graduation. In addition, such students may be subject to withdrawal from the Graduate School.

Reduction in Registration and Tuition. Full refunds are granted students who reduce registration on the drop/add date at the beginning of each semester. A reduction in registration and tuition necessitated by changes in departmental service requirements for assistants may be made during the first week of classes with approval of the Dean.

Refunds for Withdrawal from School during Fall and Spring Semesters. For students who withdraw from school or who are withdrawn by the University, refunds of tuition and fees are governed by the following policy.

1. In the event of death, refund of full tuition and fees will be granted.
2. In all other cases of withdrawal from the University, students may have tuition refunded according to the following schedule:
 - a. Withdrawal before classes begin: full refund;
 - b. Withdrawal during the first or second week of classes: 80 percent refund (the student health fee will not be refunded);
 - c. Withdrawal during the third, fourth, or fifth week of classes: 60 percent refund (the student health fee will not be refunded);
 - d. Withdrawal during the sixth week: 20 percent refund (the student health fee will not be refunded);
 - e. Withdrawal after the sixth week: no refund.
 - f. Tuition charges paid from grants or loans will be restored to those funds on the same pro rata basis and will not be refunded or carried forward.
3. If a student has to drop a course for which no alternate registration is available, drops special fee courses (music, golf, etc.), or drops a paid audit during the first two weeks of the drop/add period, a full refund may be granted with the approval of the Dean. (The student health fee will not be refunded.)

Withdrawal Charges and Refunds during Summer Session. Students who will not be attending a summer term or course(s) for which they have registered must follow the correct procedure and drop the course(s) prior to the first day of the term, even if they have not paid tuition and fees. Failure to drop the course(s) will result in administrative withdrawal from the summer session at the end of the first three days of the term and in billing the student for 20 percent of the tuition plus the health fee. If tuition and fees have been paid for the summer term, the following refund policies apply:

1. When applications for withdrawal from a term or drop of a course are received by the Director of the Summer Session before the first class day of a given term, full tuition and fees will be refunded.
2. When applications for withdrawal are received by the Director during the first three class days, 80 percent of the tuition will be refunded. (The health fee will not be refunded.)
3. When applications for withdrawal from a term or drop of a course are received by the Director after the third class day, there will be no refund of tuition and fees.

Special Tuition Benefits for Employees. The Graduate School recognizes a special obligation to encourage the professional and personal advancement of employees. The University thus grants reductions in tuition to eligible employees enrolling in courses offered by the University.

Half-time employees with one or more years of continuous service who receive permission of their supervisors may take up to two courses a semester and will be charged one-half of the tuition rate. This benefit applies *only* to nondegree work. Full-time employees (30 or more hours a week) with two or more years of continuous service who receive permission to take such courses will be charged one-tenth the tuition rate for up

to two courses per semester and will be permitted to audit at no charge. This benefit applies to degree work as well as nondegree.

Employees who wish to take graduate classes on a nondegree basis apply through Continuing Education. No Graduate Record Exam is required at this point. If an employee is later admitted into a degree program, up to 12 semester hours of these credits may then be transferred into that program.

Employees wishing to enroll in a graduate degree program may apply directly to the Graduate School. Since not all of these programs can accommodate part-time study, please make early contact with the appropriate department for advice on your particular educational needs.

Eligible employees should consult the Benefits Office, 705 Broad Street, (919) 684-6723, at least one week in advance of payment date to obtain the appropriate tuition voucher.

Thesis or Dissertation Fees. Fees incurred in connection with a thesis or dissertation are as follows:

Binding fee, three University copies of thesis or dissertation	\$22.50
Microfilming fee, doctoral degree only, upon final submission	\$40
Copyright fee (doctoral degree only, optional)	\$20

Athletic Fee. An athletic fee of \$100 for football and basketball games, or \$25 for football games only, is optional and payable in the fall semester. The Treasurer of the University has sole responsibility for collection of fees.

Fee for Undergraduate Courses. Graduate students registering for undergraduate courses will be assessed 3 units for a nonlaboratory course and 4 units for a laboratory course.

Marine Laboratory Fee. For Marine Laboratory investigators' research table fee, see the *Bulletin of Duke University: Marine Laboratory*.

Audit Fee. Students registered full time during fall and spring may audit courses without charge. Students may not audit activity courses, e.g., physical education, or applied music. Otherwise, audit fees are \$125 per course.

During the summer, students registered for a full course program (two courses) may audit nonlaboratory courses (except physical education activity courses, applied music courses, and studio art courses) with the permission of the instructor and the Director of the Summer Session at no extra charge. Students carrying less than a full course program during the summer may be granted permission by the instructor and the Director to audit a course (above restrictions apply), but must pay half the University tuition charge for the course.

Vehicle Fee. Each student possessing or maintaining a motor vehicle at Duke University must register it at the beginning of the fall semester with the security office at 2010 Campus Drive. A student who acquires a motor vehicle and maintains it at Duke University after academic registration must register it within five calendar days after operation on the campus begins. Resident students are required to pay an annual fee of \$30 for each motor vehicle or \$15 for each two-wheeled motor vehicle. Resident students registering a vehicle for the first time after January 1 are required to pay \$20 for a motor vehicle or \$10 for a two-wheeled motor vehicle.

If a motor vehicle or a two-wheeled vehicle is removed from the campus permanently and the decal is returned to the traffic office prior to January 20, there will be a refund of \$10 for a motor vehicle and \$5 for a two-wheeled motor vehicle.

Students enrolled in the summer session only must also register their motor vehicles with the traffic control office. The fee is \$4.50 for thirty days.

Transcript Fee. Students who wish to obtain copies of their academic records should direct requests to the Registrar's office. A fee of \$1 is charged for each copy.

The Student Health Fee. All full-time students and part-time degree candidates (except those registered *in absentia*) are assessed a fee for the Student Health Service. For the fall and spring, the fee is \$238 (\$119 each semester). For the summer, the fee is \$35 per term. The health fee will be \$29 for each five-week period at the Marine Laboratory.

Expenses*

Housing Fee. The fee for Town House Apartments, not including utilities, is \$2,012 per occupant for the fall and spring on the basis of two students to a two-bedroom apartment. The fee for modular homes, not including utilities, is \$1,769 per occupant on the basis of three students to a home. Rates in Central Campus Apartments range from \$2,020 per occupant for three students in a three-bedroom apartment to \$3,118 for an efficiency apartment.

Apartments are available during the summer and rates vary according to the type of unit desired and the number of persons occupying the apartment.

Housing fees are subject to change prior to the 1988-89 academic year. A \$100 deposit is required with all applications. Refund on housing fees is made in accordance with the schedules published by the Department of Housing Management. For further information on housing facilities, see the section on living accommodations in the chapter on "Student Life."

Food. Food service is described in the section on living accommodations in the chapter on "Student Life." The cost of meals is estimated at a minimum of \$9.50 per day, or about \$2,195 for the academic year.

Summary. The table below represents an estimate of a graduate student's basic expenses during the fall and spring for a full program of work. Miscellaneous items (recreation, travel, clothing, laundry, etc.) will vary according to personal needs and tastes.

Tuition	\$7,200 (24 units)
Registration fee	600
Student health fee	238
Apartment rent (Central Campus Apts.)	2,452
Meals	2,195
Books	700
Miscellaneous (laundry, etc.)	2,204
Total	\$15,589

The estimated cost for one term of the summer session is:

Tuition (two nonlaboratory courses or 6 graduate units)	\$1,596
Registration Fee	100
Student health fee	35
Apartment Rent (Central Campus Apts.)	410
Meals	500
Books and class materials (average)	60
Miscellaneous (laundry, etc.)	203
Total	\$2,904

*The figures contained in this section are based on 1987 figures and are subject to change prior to the beginning of the fall 1988 semester.

Fellowships and Scholarships

Application Procedure. Fellowships and scholarships are available to students in most graduate programs. A student who wishes to be considered for any of the following fellowships, scholarships, or assistantships should so indicate on the application form for admission and award. Selection of award recipients is made on the basis of academic merit and departmental recommendations.

While personal financial need may not be the basis for the granting of many graduate awards, the Graduate School requests that all matriculating students (except non-United States citizens) complete the Graduate and Professional Student Financial Aid Service (GAPSFAS) form.

James B. Duke Fellowships. The James B. Duke One-Hundredth Anniversary Fund provides fellowships for students who wish to pursue a program leading to the Ph.D. degree in the Graduate School at Duke University. Its objective is to aid in attracting and developing outstanding scholars at Duke. Selection of recipients is made by a faculty committee upon nomination by the appropriate department. These fellowships provide for payment of tuition for full registration during the academic year, plus the registration fee during the summer sessions. They also provide an income stipend of \$1,000 per month for twelve months during the duration of the award. Students entering with baccalaureate degrees may hold this fellowship for three years. Students entering with master's degrees may be fellows for two years. The award requires no service and is renewable each year if the student is satisfactorily progressing toward the degree. The total value of a James B. Duke Fellowship over the three years of tenure for a student who enters Duke with the B.A. degree is over \$60,000 at current tuition rates. There are forty-five James B. Duke fellows currently enrolled.

Andrew W. Mellon Graduate Fellowships in the Humanities. As many as six one-year dissertation fellowships are awarded to graduate students in the humanities. Selection of recipients is made by a faculty committee upon recommendation by the appropriate department. These fellowships provide for payment of tuition and health fees plus a monthly stipend.

Endowed Fellowships. Other special endowments provide fellowships for graduate study. The Angier B. Duke Fellowship provides support on the same level as the James B. Duke Fellowship for one student for three academic years. There are five Gurney Harris Kearns Fellowships in religion. Selection for these fellowships is made through faculty committees. The E. Bayard Halsted Fellowship in science, history, or journalism is awarded to a graduate of Duke University intending to pursue an advanced degree at Duke. The Frank T. de Vyver Fellowship, administered by the Department of Economics, is awarded each year to an outstanding student entering the doctoral program in economics. The Clare Hamilton Memorial Endowed Fellowship is awarded yearly on the basis of merit and need to one or more outstanding students in clinical psychology. The Charles R. Hauser Fellowship is awarded to an outstanding graduate student in the last year of work toward a Ph.D. degree in organic chemistry. The Calvin Bryce Hoover Fellowship is administered by the Department of Economics and is awarded each year to an outstanding student entering the doctoral program in economics. The Robert R. Wilson Fellowship in the Department of Political Science is awarded to a student currently enrolled in or entering a doctoral program in international law, international organization, or international relations. The Gertrude Weil Fellowship, administered by the Department of Religion, is awarded to students interested in Judaic studies. The John L. Lievsay Fellowship is awarded to a dissertation-year student in English literature. The Anne McDougall Memorial Award for Women, administered through women's studies, is awarded each year to one woman student studying psychology or a related field.

Graduate Fellowships. Graduate fellowships funded by Duke University are available to students in the Graduate School for study during the academic year. Awards, which include tuition, range from \$8,610 to \$15,000.

Federal Fellowships.* Duke University participates in the following programs:

National Science Foundation Fellowships. A number of students hold National Science Foundation Graduate Fellowships which provide tuition plus a stipend of \$12,300.

Jacob K. Javits Fellows Program. Five students received the Jacob K. Javits Fellowships in 1987-88. This federal program for students in the humanities provides tuition plus a stipend of up to \$10,000 based on the student's need.

Other federal programs support fellowships, traineeships, and research assistantships through departmental auspices.

Fellowships in Medieval and Renaissance Studies. Three fellowships are awarded annually by the Duke University Committee on Medieval and Renaissance Studies. Fellows are chosen from among students enrolled in Ph.D. programs. They receive full tuition, plus a monthly stipend of \$800 for nine months, and may request two renewals of the appointment.

Special Fellowships. The following special fellowships are available to qualified Duke students from sources outside the University:

Shell Fellowships. Available to students in the social sciences engaged in dissertation research on developing countries. Recipients must be citizens of the United States or permanent residents intending to become United States citizens. The fellowships are designed to cover the expenses of field research in the preparation of doctoral dissertations. The stipend for each fellowship is \$7,000 plus a reasonable amount for transportation expenses. Recipients are chosen competitively from departmental nominees. Inquiries should be made to the Program Coordinator, Center for International Studies, 2122 Campus Drive, Durham, North Carolina 27706.

Exchange Fellowships with the Free University of Berlin. Fellowships are available through an exchange arrangement with the Free University of Berlin which will provide funds for one graduate student to study during the regular academic year in Berlin. Interested students should write to the Dean of the Graduate School prior to February 1.

Graduate Fellowships for Minority Students. A substantial pool of fellowship funds is reserved for the support of minority students, in some instances with a multi-year commitment. The funds are allocated with advice from a special committee of the Graduate faculty.

James B. Duke International Studies Fellowships. Available to outstanding students from foreign countries who have completed their undergraduate education in institutions outside the United States. Eligibility criteria include concentration in areas broadly defined as international studies, and admission to a Ph.D. program in Duke's Graduate School. Fellowships provide an annual stipend of \$12,000, payable for twelve months, plus tuition and health fees. They are renewable for three years. Recipients are chosen competitively from departmental nominees by a faculty committee. In addition, the program offers a one-year fellowship to an advanced Duke graduate student planning dissertation research abroad in the field of international studies who has passed the preliminary examinations by the time the award begins.

Frederick K. Weyerhaeuser Forest History Fellowship. Fellowship is available campus-wide to students who wish to study broadly in the area of forest and conservation history. The annual stipend is \$10,000. Inquiries should be made to the Forest History Society, 701 Vickers Avenue, Durham, North Carolina 27701.

Departmental Fellowships. Various departments and schools within Duke University have fellowships which are available to students pursuing graduate study. Information may be obtained from the individual departments.

*United States citizenship is generally a requirement for eligibility.

Graduate Scholarships. Graduate scholarships funded by Duke University are available to students in many departments of the Graduate School for study during the academic year. Awards are for full or partial payment of tuition; they range in value to \$8,610.

Alison Bracy von Brock Talent Identification Program Research Fellowship Fund. This fund will support research in the area of the academically talented, curriculum design and/or teaching methods of the Talent Identification Program. First priority will be given to a Duke University doctoral candidate for postpreliminary examination dissertation research. Second priority shall be given to a qualified postdoctoral candidate to conduct research at Duke University as a visiting fellow under the auspices of the Talent Identification Program. The award will be made for one year with a possible renewal for a second year.

Assistantships

Graduate Assistantships. Appointments as graduate assistants carry a total stipend of up to \$7,500 for the academic year. The value of the stipend is determined by the time spent in assisting, the qualifications of the assistant, and the nature of the work assigned. Graduate assistants also may receive tuition scholarships in addition to payments for service as an assistant.

Research Assistantships. Appointments are available for graduate students whose special training and qualifications enable them to serve as assistants to individual staff members in certain departments. Stipends may be up to \$8,400, depending on the nature of the assistance and the assisting time required.

Part-time Instruction. Several departments offering graduate work have exceptionally qualified graduate students work as part-time instructors, tutors, and teaching assistants. Amounts of these assistantships vary and interested applicants should contact their departments directly.

Payment of Awards

The payment of stipends for graduate assistantships and fellowships starts on September 25 and is made in equal payments on the twenty-fifth day of each month thereafter. Under the Tax Reform Act of 1986, the only graduate student financial assistance exempt from taxation are amounts paid for tuition, fees, books, supplies, and equipment required for course instruction. If services are required for payment of tuition and fees, then that tuition is considered income and is subject to taxation. The graduate school office will supply detailed information.

It is the responsibility of the student to be sure that tuition and fees are paid or that arrangements have been made with the appropriate office or department for submission of tuition payment notices to the Bursar (101 Allen Building). Graduate students should contact either the Director of Graduate Studies in their department or the Graduate School Financial Aid Coordinator (123 Allen Building) depending upon the type of award. Faculty, senior administrative staff, employees, and eligible spouses not in degree programs should contact Harrison Brooke (705 Broad Street) regarding tuition benefits.

Loans

Students who anticipate a need to supplement their financial resources through loans or college work-study employment must obtain and complete a Graduate and Professional Student Financial Aid Service (GAPSEAS) form. These forms are available at most financial aid offices or from the Financial Aid Coordinator, Graduate School, Duke

University, Durham, North Carolina 27706. A student seeking a loan should contact his or her state lending agency.

It is the policy of the Graduate School to provide loans through the University to help students meet their educational expenses. Only students with full-time status who meet the federal criteria for need are eligible for loans. Loan funds are provided through the Carl Perkins Student Loan Program after a student has borrowed the maximum from the Guaranteed Student Loan Program. Generally, loans made from these funds, as is the case with loans from state agencies, bear no interest charge to qualified borrowers while they maintain student status and for a short period thereafter. Interest during the repayment period is at a favorable rate.

Inquiries concerning loans should indicate the department of intended matriculation and include all pertinent information concerning application to a state agency. These inquiries should be addressed to the Financial Aid Coordinator, Graduate School, Duke University, Durham, North Carolina 27706.

Work-Study Program Employment

Funds are available through the college work-study program for short-term or part-time employment of graduate students. A student who wishes to apply for work-study must complete a GAPSFAS form. Students considering the possibility of work-study for the fall should submit GAPSFAS forms by April 15. Eligibility requirements are similar to those of the federal loan programs. In addition to departmental employment opportunities, the placement office maintains a listing of employment openings for students.

Summer Financial Aid

A limited amount of financial aid is available to students in summer study. Summer financial aid, determined according to demonstrated need, may consist of institutional grant funds and/or low interest loans from the Federally Insured Student Loan program and the Carl Perkins Student Loan program. To qualify for summer school aid, a student must be enrolled or accepted for enrollment at Duke during the academic year immediately preceding the summer for which aid is requested. (Students enrolled only for the summer may be eligible to borrow from outside lenders under the Federally Insured/Guaranteed Loan program in their home states or from the schools at which they are regularly enrolled. They should contact their college's financial aid office or the state's department of higher education for information and applications.) The college work-study aid is determined by the financial aid office based upon the student's financial need and the availability of funds. Graduate awards are determined by departments depending on usual criteria and availability of funds.



Registration



Registration for Fall 1988

All students must register each fall and spring semester for credit toward their degrees and pay a registration fee each semester unless waived by an approved leave of absence granted by the Dean. Doctoral students are expected to register for 60 units of degree credit. After the 60 units of credit have been achieved, the student will pay only the registration fee each semester until all degree requirements have been met. A master's student (except for those students enrolled in the two-year health administration, physical therapy, and public policy studies programs) will register for a minimum of 30 units of degree credit and for any course units beyond the 30 required of their program. A registration fee is charged each semester.

Approved transfer course work into a master's program will *not* reduce the minimum registration for a master's degree of 30 units at Duke University. Approved transfer of an earned master's degree will reduce the minimum doctoral registration to 45 units of degree credit at Duke University.

Full-time students will register at the rate of either 9 units as teaching or research assistants or 12 units each semester until the minimum units of degree credit have been completed. Part-time students will register for a minimum of 3 units per semester.

Students who are in residence during the summer session, but not enrolled in any courses, pay only the registration fee.

Except for these registration procedures, all other degree regulations remain as stated in the other sections of this bulletin.

All students who enrolled prior to 1985 should consult the bulletin of their year of matriculation for registration procedures and requirements.

Registration Periods. All students who are enrolled in the Graduate School and who have not been granted a leave of absence by the Dean must register each fall and spring until all degree requirements are completed. New students will register immediately prior to the first day of classes in either term; continuing students register during the announced preregistration periods in November and March. Students who have been on leaves of absence and who intend to resume a degree program must give the department and the Dean notice of this intention two months before registration.

Late Registration. All students are expected to register at the times specified by the University. A late registration fee of \$25 is charged any student registering late, including a current student who delays registering until the registration for new students.

Change of Registration. During the first two weeks of the fall or spring semester, registration may be changed with the approval of the Director of Graduate Studies if no reduction of fee is entailed. If fees are to be refunded, the approval of the Dean of the Graduate

School is required. For the succeeding two weeks, courses may be dropped and equivalent hours of ungraded research or residence added with the approval of the Director of Graduate Studies and the Dean.

Summer Registration. Students who are in residence at Duke University during the spring and who plan to enroll for courses in the summer session may have their course programs approved by the Director of Graduate Studies during the week of Graduate School registration in March. Course cards for courses or graded research should be submitted to the Office of the Summer Session. Summer session students may register in the summer session office at any time beginning with the March registration period and up to the Wednesday preceding the start of the appropriate term. Graduate students who intend to remain in residence during one or more of the summer session terms without registering for course work must either register for 1 unit of research (students who matriculated prior to fall 1985) or pay a summer registration fee (students who matriculated fall 1985 or later).

Students who are not in residence at Duke during the spring (including newly admitted students to the Graduate School and students of other colleges and universities desiring to earn credits for transfer) may register by mail for the summer session. Advance registration by mail includes:

1. Completion of the summer session application. (Applications may be obtained by writing to the Office of the Summer Session, 121 Allen Building.)
2. Admission to the summer session by the Director of the Summer Session. (Students who have been admitted to the Graduate School for the summer term need not apply to the summer session.)
3. Submission of a properly approved and completed course card in the Office of the Summer Session.

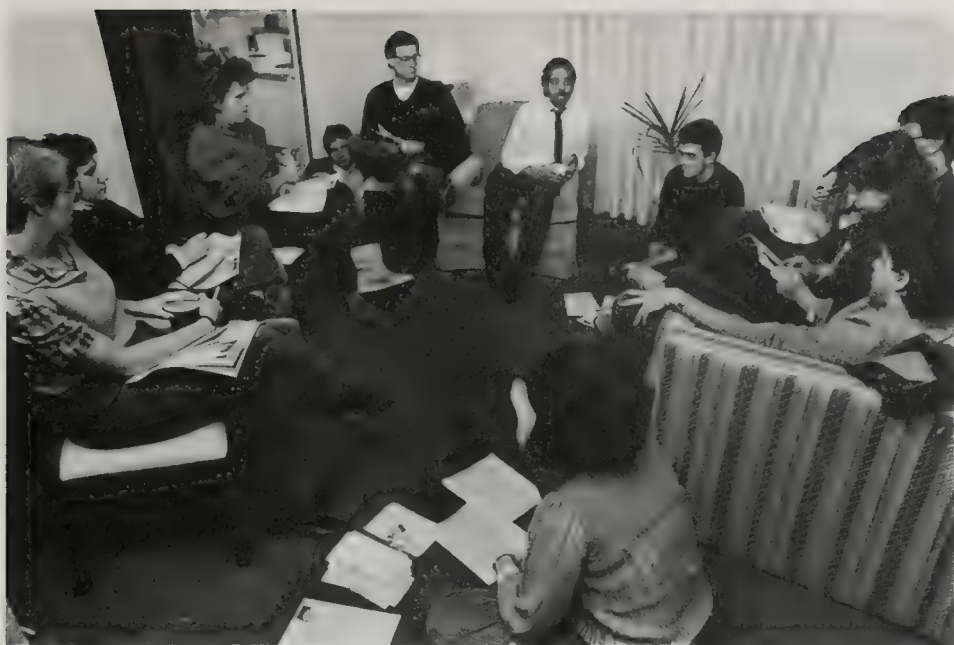
The University does not mail statements for summer session tuition and fees. All tuition and fees should be paid in the Office of the Bursar (101 Allen Building) at least *five full working days* prior to the first day of class (see summer session calendar). Students who fail to register and pay all tuition and fees before this deadline will be assessed a late charge. Failure to pay tuition and fees by the end of the drop/add period will result in administrative withdrawal of the student.

After April 30 all course changes must be approved by the appropriate director of graduate studies. The Director of the Summer Session serves as the dean for all non-Duke students. Course changes are accomplished by submitting the three-part drop/add form to the Office of the Summer Session, 121 Allen Building. Students who are out of town must contact their director of graduate studies directly to arrange for dropping or adding courses.

Summer session students may add a course or courses before or during the first three days of the term. Courses may also be dropped before and during the first three days, but a 20 percent tuition fee will be charged (1) if the course is not dropped before the first day, and (2) the dropped course(s) results in a total tuition reduction. Courses dropped after the third day of classes are not eligible for tuition refund.

Additional Registration Requirements. It is necessary to be a fully registered student according to the regulations listed in the chapter on "Registration" in order to be eligible for library carrel and laboratory space, student housing, University and some outside loans, and the Student Health Service, including accident and sickness insurance. See the chapter on "Student Life."

Part-time graduate students must be enrolled for at least 8 units each semester in order to qualify for loans (National Direct Student Loan, Guaranteed Student Loan).



Regulations



General Academic Regulations

Credits. The following regulations pertain to credits earned outside the Duke University Graduate School:

Graduate Credit Earned before the A.B. Degree Is Granted. Ordinarily no credit will be allowed for graduate courses taken before a student has been awarded the A.B. or B.S. degree. However, an undergraduate student at Duke University, who at the beginning of the final semester lacks no more than three courses in order to fulfill the requirements of the bachelor's degree, may apply for admission to the Graduate School for that final semester. If the student meets the requirements for admission, permission may be obtained from the Dean of the Graduate School to enroll for graduate courses to bring the total program to no more than five courses. In addition to undergraduate registration, the student must register in and pay tuition for those courses to the Graduate School at the beginning of the semester in which graduate credit is to be earned in order for the courses to be credited toward a graduate degree program.

Transfer of Graduate Credits. Transfer of credit for graduate work completed at another institution will be considered only after a student has earned a minimum of 12 units of graduate study at Duke University. After completing the 12 units, the student should file a request for transfer of credits on the appropriate Graduate School form.

Summer Session Credit. Summer session *credit* does not mean degree credit at Duke University unless the student has been admitted as a degree candidate by one of the colleges or schools of the University. The majority of summer session courses carry 3 units of credit and require one term of residence. A student taking a course for credit is expected to do all the work required and to take the final examination, and will receive a grade. (*G. I. Bill benefits are available only to those veterans who enroll for credit.*)

Grades. Grades in the Graduate School are as follows: *E*, *G*, *S*, *F*, and *I*. *E* (excellent) is the highest mark; *G* (good) and *S* (satisfactory) are the remaining passing marks; *F* (failing) is an unsatisfactory grade; and *I* (incomplete) indicates that some portion of the student's work is lacking, *for an acceptable reason*, at the time the grades are reported. For students enrolled in the Graduate School, the instructor who gives an *I* for a course specifies the date by which the student must make up the deficiency. For unclassified graduate students enrolled in the summer session, a temporary *I* for a course may be assigned after the student has submitted a written request. If the request is approved by the instructor of the course, then the student must satisfactorily complete the work prior to the last day of classes of the subsequent summer term. If a course is not completed within one calendar year from the date the course ended, the grade of *I* becomes permanent and may not be removed from the student's record. The grade of *Z* indicates satisfactory progress at the end of the first semester of a two-semester course. A grade of *F* in a

major course normally occasions withdrawal from a degree program not later than the end of the ensuing semester or term; a grade of *F* in any other course occasions academic probation.

Reciprocal or Interinstitutional Agreements with Neighboring Universities. Under a plan of cooperation between Duke University and the University of North Carolina at Chapel Hill, North Carolina Central University in Durham, and North Carolina State University at Raleigh, students properly enrolled in the Graduate School of Duke University during the regular academic year, and paying full tuition to this institution, may be admitted to a maximum of two courses per semester at one of the other institutions in the cooperative plan. A Ph.D. student who matriculated prior to fall semester 1985, who has passed the preliminary examination, and who registers for a minimum of 3 units at Duke, may register for 3 to 6 additional units at the other institution. Under the same arrangement, students in the graduate schools in the neighboring institutions may be admitted to course work at Duke University. Credit so earned is not defined as transfer credit. To take advantage of this arrangement during any summer session term, the student registers each term for 3 units of credit at the home institution and 3 units of credit at the other institution, for a total of 6 units. All interinstitutional registrations involving extra-fee courses or special fees required of all students will be made at the expense of the student and will not be considered a part of the Duke University tuition coverage. This reciprocal agreement does not apply to contract programs such as the American Dance Festival.

Identification Cards. Graduate students are issued identification cards which they should carry at all times. The card is a means of identification for library privileges, athletic events, and other University functions or services open to them as University students. Students will be expected to present their cards on request to any University official or employee. The card is not transferable, and fraudulent use may result in loss of student privileges or suspension from the Graduate School. A report of the loss of a card must be given immediately to the Registrar's office. The cost of a new ID card is \$5.

Courses Primarily for Undergraduates. Students granted provisional admission and others whose preparation is found deficient may occasionally be required, as part of their programs, to take undergraduate courses as prerequisites to continued graduate study. Undergraduate courses thus taken and others elected by the student carry no credit toward a degree.

In exceptional cases, 100-level courses outside the major department may be taken for degree credit to a maximum of two one-semester courses or a one year course not exceeding a total of 8 units, when approved by the Director of Graduate Studies in the major department and in the department in which the course is listed. In order to receive credit for any such undergraduate work, the graduate student must earn a grade of at least *B*.

Under the above conditions, and with the additional approval of the student's department or program, foreign language reading courses numbered above 100 may form a part or all of such degree credit. This provision is effective only for language courses taken after the spring 1988 semester.

Withdrawal from a Course. For permissible changes during the first four weeks of the fall or spring semester and during the first three days of summer session term, see the chapter on "Registration." If a course is dropped without the necessary approval, the permanent record will, at the discretion of the Dean of the Graduate School and with the permission of the instructor, list the course as withdrawal error (WE). If a course is dropped after the four-week period during the fall or spring or after the first three days of classes during the summer, the status of the student at the time of withdrawal from

the course will be determined and indicated on the permanent record as *Withdrew Passing (WP)* or *Withdrew Failing (WF)*.

Interruption of Program and Withdrawal from the Graduate School. Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the University.

The University reserves the right, and matriculation by the student is a concession to this right, to request the withdrawal of any student whose academic performance at any time is not satisfactory to the University. A student who wishes for any reason to withdraw from the Graduate School during the fall or spring should notify in writing both the Director of Graduate Studies in the major department and the Dean of the Graduate School prior to the date of the expected withdrawal and no later than the published last day of classes for that semester or summer session. If students wish to withdraw from the summer session, they must consult both the Dean of the school or college in which they are registered and the Director of the Summer Session. For refunds upon withdrawal, see the chapter on "Financial Information."

A student who, after successfully completing one semester of graduate study, must withdraw before completion of a graduate program may, with the approval of the major department, request the Dean to issue a certificate of graduate study.

Leave of Absence. A leave of absence for a period of time no longer than one calendar year may be granted because of medical necessity, full-time employment, acceptance of an external award judged likely to benefit the student as an individual but not related to the degree requirements, or other acceptable reasons. A request for a leave of absence should be originated by the student, endorsed by the student's major professor and Director of Graduate Studies, and submitted to the Dean of the Graduate School for consideration prior to the beginning of the semester for which the leave is requested. A student is eligible to request a leave of absence only after having completed at least one semester at Duke. Time limitations which pertain to the various degrees and the completion of courses on which a grade of *I* (incomplete) was earned are not waived.

Language Requirements. The Graduate School has no foreign language requirement for any of the degrees. Individual departments, however, may require foreign language proficiency. See individual departmental sections in this bulletin or contact the appropriate Director of Graduate Studies to determine specific requirements.

English as a Second Language. International graduate students may take advantage of a course designed to familiarize them with the American English sound system and with the structures and expectations of English written discourse. English 200 is neither a remedial course nor a conversational course, but is advanced-level preparation for the papers and presentations required of the graduate student and professional. Additionally, the instructors offer coaching and editing in presentations, written and oral, throughout the student's tenure at Duke. Although English 200 is a regular three-hour graduate course, its credits will not count toward the minimum registration required for graduate degrees at Duke University.

Degree Regulations—The Master's Degrees

MASTER OF ARTS

Prerequisites. As a prerequisite to graduate study in the major subjects, a student must have completed a minimum of 24 undergraduate semester hours—ordinarily 12

semester hours of approved college courses in the major subject and 12 semester hours in the major or in related work. Since some departments require more than 12 semester hours in the proposed field of study, students should read carefully the special requirements listed by their major departments in the chapter on "Courses of Instruction." If special master's requirements are not specified in this chapter and there is a question about the prerequisite, prospective students should write directly to the appropriate Director of Graduate Studies.

Language Requirements. The Graduate School requires no foreign language for the master's degree. Certain departments, however, do have language requirements and these must be satisfied before the master's examination can be taken. See the departmental listings in the chapter on "Courses of Instruction."

Major and Related Subjects. Thirty units of graduate credit at Duke constitutes minimum enrollment for the Master of Arts degree. The students must present acceptable grades for a minimum of 24 units of graded course work, 12 of which must be in the major subject. A minimum of 6 units of the required 24 must be in a minor subject or in related fields which are approved by the student's major department. The remaining 6 units of the required 24 may be taken either in the major or in related fields approved by the major department and the Dean of the Graduate School.

Individual departments decide whether the M.A. program may be completed by submission of an approved thesis or by other academic exercises (see requirements listed in the chapter on "Courses of Instruction"). In either case, a maximum of 6 units may be earned by the completion exercises and the final examination.

Thesis Requirements. The thesis should demonstrate the student's ability to collect, arrange, interpret, and report pertinent material on a research problem. The thesis must be written in an acceptable style and should exhibit the student's competence in scholarly procedures. Requirements of form are set forth in the *Duke University Guide for the Preparation of Theses and Dissertations*, copies of which are available in the Graduate School office.

The thesis must be submitted in an approved form to the Dean of the Graduate School on or before April 15 for a May degree, one week before the final day of the Duke University second summer term for a September degree, one week before the final day of the fall semester for a December degree, and at least one week before the scheduled date of the final examination. The copies of the thesis then will be distributed by the student to the several members of the examining committee. Two copies for the library and one copy for the adviser will be bound upon payment of the University binding fee of \$22.50.

The Examining Committee and the Examination. The faculty member who directs the student's program recommends an examining committee composed of three members of the graduate faculty, one of whom usually must be from a department other than the major department. If the student has been permitted to take related work within the major department, the third member may be chosen from within the department. Nominations for membership on this committee are submitted for approval to the Dean of the Graduate School at least one week preceding the final examination.

The committee will conduct the examination and certify the student's success or failure by signing the card provided by the Graduate School office. This card indicates completion of all requirements for the degree. If a thesis is presented, the committee members also sign all copies of the thesis, and the candidate then returns the original and first two copies to the Graduate School office.

MASTER OF SCIENCE

Prerequisites. A bachelor's degree is a prerequisite for the M.S. degree. Departments offering an M.S. degree consider for admission students from allied fields provided they have satisfactory scientific and mathematical backgrounds.

Language Requirements. There is no foreign language requirement in Master of Science degree programs.

Major and Related Subjects. Thirty units of graduate credit at Duke constitutes minimum enrollment for the Master of Science degree. The student must present acceptable grades for a minimum of 24 units of graded graduate courses. Of these, at least 12 units must be in the major subject. A minimum of 6 units must be in a minor subject or in related fields which are approved by the student's major department. The remaining 6 units of the required 24 may be taken either in the major or in related fields approved by the major department and by the Dean of the Graduate School. A maximum of 6 units may be earned either by submission of an approved thesis, or by completing courses or other academic activities approved by the student's department. As other requirements vary according to department, please consult the chapter on "Courses of Instruction" for further information.

Thesis and Examination. Some departments require a thesis; all departments require an examination. The regulations and options for theses and other means of completing the program, as well as the provisions for examination and the examining committee, are the same as the requirements for the Master of Arts degree.

MASTER OF HEALTH ADMINISTRATION

Prerequisites. Students with any undergraduate major may apply. Algebra at the college level is the only prerequisite, and a special course is available each summer for students whose preparation in mathematics is inadequate or out of date.

Major Subjects. The Master of Health Administration requires a minimum of 67 units of graduate credit, and the program is normally completed in four semesters.

Additional Master's Regulations

Filing the Intention to Receive Degree. On or before *February 1* for a May degree, on or before *August 1* for a September degree, or on or before *December 1* for a December degree, and at least one month prior to the final examination, the student must file in the Office of the Graduate School, on the official form, a declaration of intention to graduate. The declaration of intention presents the title of the thesis or specifies alternative academic exercises on which the degree candidate will be examined. During their final semester students may not change from a thesis program to a non-thesis program or from a non-thesis program to a thesis program after this form has been filed with the Graduate School Office. The declaration must have the approval of both the Director of Graduate Studies in the major department and the chairman of the student's advisory committee.

Transfer of Credits. A maximum of 6 accredited units of graduate credit may be transferred for graduate courses completed at other institutions. Such units will be transferred only if the student has received a grade of *B* (or its equivalent) or better. The transfer of graduate credit does not reduce the required minimum registration of 30 units for a master's degree at Duke. Requests for transfer should be submitted on the approved Graduate School form.

A student who is granted such transfer credit may be permitted to register for as much as 12 units of thesis research instead of the usual 6 units. As another option, a student may take as many as 6 units of further undergraduate training or 6 units of required language courses on the undergraduate level.

Nondegree Students. Credit for graduate courses taken at Duke by a student (not undergraduate) before degree admission to the Graduate School or while registered as a nondegree student through the Office of Continuing Education or the Graduate School may be carried over into a graduate degree program if (1) the action is recommended

by the student's Director of Graduate Studies and approved by the Dean, (2) the amount of such credit does not exceed 12 units, (3) the work has received grades of G or better, and (4) the work is not more than two years old, and (5) the student applies for and is granted formal admission into a degree program.

Time Limits for Completion of Master's Degrees. Master's degree candidates who are in residence for consecutive academic years should complete all requirements for the degree *within two calendar years* from the date of their first registration in the Graduate School. Candidates must complete all requirements *within six calendar years of their first registration*.

To be awarded a degree in May, the recording of transfer credit must be completed by the first day of the final examination period and all other requirements must be completed by the last day of the final examination period. If a thesis is one of the requirements, it must be submitted to the Graduate School office no later than April 15. Candidates desiring to have their degrees conferred on September 1 must have completed all requirements, including the recording of transfer of credit, by the final day of the Duke University summer session. Candidates completing degree requirements after that date and during the fall will have their degrees conferred on December 30.

Degree Regulations—The Doctoral Degree

Requirements. The formal requirements for the Ph.D. degree are as follows: (1) major and related courses, (2) foreign language(s) in many departments, (3) a supervisory committee for the student's program of study, (4) residence, (5) preliminary examination, (6) dissertation, and (7) final examination. In order to be considered for candidacy for the Ph.D. degree, the student must have passing grades in all course work.

Major and Related Work. The student's program of study demands substantial concentration on courses in the major department. However, a minimum of 6 units in a related field approved by the major department must be included. A few programs have been authorized by the Executive Committee of the Graduate Faculty to utilize courses in fields within the major department in fulfilling the related field requirement. If there are deficiencies in a student's undergraduate program, departments may require certain undergraduate courses to be taken for which the student will not receive degree credit. In all cases the student's supervisory committee will determine if the student must meet requirements above the minimum.

Foreign Languages. The Graduate School has no foreign language requirement for the Ph.D. Some departments require two languages; other departments have no foreign language requirements. For specific departmental requirements, see the chapter on "Courses of Instruction" or contact the appropriate Director of Graduate Studies.

Students working toward the doctoral degree in a department requiring a foreign language(s) should complete this requirement by the end of their first year of residence. Those who fail to meet the requirement by the end of their third semester of residence should register in the appropriate special reading course. Any foreign language requirement must be met before the preliminary examination is taken.

Committee to Supervise the Program of Study. As early in a student's course of study as is practicable and *not later than two months before the preliminary examination*, the Director of Graduate Studies in the major department will nominate for the approval of the Dean a supervising committee consisting of five members, with one member designated as chairman. This committee will include at least three graduate faculty members of the major department and, usually, at least one from outside the department. For programs in which approval has been granted for related work from a clearly differentiated division within the department, one member of the committee will be chosen from that

division. This committee, with all members participating, will determine a program of study and administer the preliminary examination.

Residence. The *minimum* residence requirement is one academic year (two consecutive semesters in the same academic year) of full-time registration at Duke (that is, registration of 12 units each semester or, in the case of graduate assistants, 9 units each semester). The *minimum* registration requirement is 60 units of graduate degree credit, of which not more than 15 units of a completed master's degree may be accepted by transfer. Such transfer of credit will not reduce the minimum requirement of one full-time academic year at Duke.

Time Limits. Ordinarily a student registered for full-time study should pass the preliminary examination by the end of the third year. A student who has not passed the examination by the end of this time must file with the Dean of the Graduate School a statement, approved by the Director of Graduate Studies in the major department, explaining the delay and setting a date for the examination. Except under unusual circumstances, extension will not be granted beyond the middle of the fourth year.

The doctoral dissertation should be submitted and accepted within two calendar years after the preliminary examination is passed. Should the dissertation not be submitted and accepted within four years after the examination, the candidate, with the approval of the committee, may petition the Dean of the Graduate School for an extension of up to one year. If this extension is granted and the dissertation is not submitted and accepted by the new deadline, the student will be dropped from candidacy. The student must then pass a second preliminary examination to be reinstated as a candidate for the degree. In such cases, the time limit for submitting the dissertation will be determined by the Dean of the Graduate School and the candidate's committee.

Ordinarily, credit is not allowed for graduate courses (including transfers) or foreign language examinations that are more than six years old at the date of the preliminary examination. Similarly, credit will not be allowed for a preliminary examination that is six years old at the date of the final examination. In cases of exceptional merit, however, the Dean of the Graduate School may extend these limits. Should the six year limits be exceeded, the student's department must submit to the Dean specific requirements for revalidating credits.

Preliminary Examination. A student is not accepted as a candidate for the Ph.D. degree until the preliminary examination has been passed. The examination ordinarily covers both the major field and related work. In the summer a preliminary examination may be scheduled only between the opening and closing dates of the summer session.

A student who fails the preliminary examination may apply, with the consent of the supervisory committee and the Dean of the Graduate School, for the privilege of a second examination to be taken no earlier than three months after the date of the first. Successful completion of the second examination requires the affirmative vote of all committee members. Failure on the second examination will render a student ineligible to continue a program for the Ph.D. degree at Duke University.

The Dissertation. The dissertation is expected to be a mature and competent piece of writing, embodying the results of significant and original research.

One month before the dissertation is presented and no later than *February 1* preceding the May commencement, *August 1* for a September degree, and *December 1* for a December degree, the student must file with the Dean of the Graduate School, on the official form available in the Graduate School office, the title of the dissertation. This title must receive the written approval of both the Director of Graduate Studies of the student's major department and the professor who directs the dissertation.

The basic requirements for preparing the dissertation (type of paper, form, and binding) are prescribed in the *Guide for the Preparation of Theses and Dissertations*, copies of which are available in the Graduate School office.

The dissertation must be completed to the satisfaction of the professor who directs the dissertation, members of the student's advisory committee, and the Dean of the Graduate School. A copy of the dissertation must be submitted to the Dean of the Graduate School on or before *April 1* preceding the May commencement, one week before the end of the Duke summer session for a September degree, or one week before the end of the fall semester for a December degree. The dissertation must be submitted to the Graduate School office at least seven days before the scheduled date of the student's examination.

All doctoral dissertations are published on microfilm through University Microfilms, Ann Arbor, Michigan. Authors may copyright them if they wish. Abstracts are published in *Dissertation Abstracts International*.

Two extra copies of the abstract (not more than 350 words long) are submitted when the dissertation is presented to the Graduate School office. A nonrefundable fee of \$40 is charged for microfilming. If copyright is desired, an additional fee of \$20 is charged. The original and two copies will be bound at a cost of \$22.50.

Final Examination. The final examination is normally administered by the five members of the supervising committee, but it may be administered by four members of the committee if the member representing the related field is present. In either case, successful completion of the final examination requires at least four affirmative votes. The final oral examination shall be primarily on the dissertation; however, questions may be asked in the candidate's major field. Except in unusual circumstances approved by the Dean, a final examination will not be scheduled when the University is not in session.

A student who fails the final examination may be allowed to take it a second time, but no earlier than six months from the date of the first examination. Permission to take the second examination must be obtained from the professor who directed the dissertation and from the Dean of the Graduate School. Failure to pass the second examination renders the student ineligible to continue work for the Ph.D. degree at Duke University.

Deposit of the Dissertation. After passing the examination, candidates bring to the Graduate School office the original and the first two copies of the dissertation, properly signed. At this time they sign the microfilming agreement and pay microfilming and copyright fees.

Commencement

Graduation exercises are held once a year, in May, when degrees are conferred on and diplomas are issued to those students who have completed requirements by the end of the spring. Those who complete degree requirements by the end of the fall or by the end of a summer term receive diplomas dated December 30 or September 1, respectively. There is a delay in the mailing of September and December diplomas because diplomas cannot be issued until they are approved by the Academic Council and the Board of Trustees.

Standards of Conduct

Duke University expects and will require of all its students cooperation in developing and maintaining high standards of scholarship and conduct.

Students are expected to meet academic requirements and financial obligations, as specified elsewhere in this bulletin, in order to remain in good standing. Certain nonacademic rules and regulations must be observed also. Failure to meet these requirements may result in dismissal by the appropriate officer of the University.

The University wishes to emphasize its policy that all students are subject to the rules and regulations of the University currently in effect or which, from time to time, are put into effect by the appropriate authorities of the University. Students, in accepting

admission, indicate their willingness to subscribe to and be governed by these rules and regulations and acknowledge the right of the University to take such disciplinary action, including suspension and/or expulsion, as may be deemed appropriate for failure to abide by such rules and regulations or for conduct adjudged unsatisfactory or detrimental to the University. University authorities will take action in accordance with due process.

Duke University, as a community of scholars, strongly relies upon the standard of academic integrity. Plagiarism and other forms of academic dishonesty represent a corruption of this integrity and, as such, cannot be tolerated within the community. Ignorance of what constitutes academic dishonesty is no excuse for actions which violate the integrity of the community. In a community which builds on the notion of academic integrity, the threat of academic dishonesty represents an intolerable risk. Students unsure about the university definition of plagiarism may wish to consult the *Bulletin of Duke University: Information and Regulations* (especially the chapter on "Academic Honesty").

Sexual Harassment Procedures. A committee of students, faculty, and administrators exists at Duke to respond to concerns about sexual intimidation in any form. For confidential assistance and information on procedures, contact Professor William Chafe (history), 684-5267, or Dr. Judith Ruderman (Continuing Education), 684-6259.

Judicial Code and Procedures. In the spring of 1971, the Graduate School community ratified and adopted the following official judicial code and procedures:

I. Graduate School Judicial Code and Procedures

A. A student, by accepting admission to the Graduate School of Duke University, thereby indicates willingness to subscribe to and be governed by the rules and regulations of the University as currently are in effect or, from time to time, are put into effect by the appropriate authorities of the University, and indicates willingness to accept disciplinary action, if behavior is adjudged to be in violation of those rules or in some way unacceptable or detrimental to the University. However, a student's position of responsibility to the authorities and the regulations of the University in no way alters or modifies responsibilities in relation to civil authorities and laws.

B. A graduate student at Duke University stands in a primary and unique relation of responsibility to the faculty in the major department, the faculty upon whose recommendation a graduate degree will or will not be awarded to the student. In matters which involve or may affect the student's intellectual or professional life, the student is directly responsible to this department and its representatives, and such matters should primarily be handled by the department.

C. Actions which appear to conflict with University-wide rules and regulations will fall under the jurisdiction of the University Judicial Board.

D. A student may elect to have the Dean of the Graduate School hear matters related to the student's conduct in addition to or instead of faculty members from the student's major department, or may elect to have such matters reviewed and judged by a judicial board instead of the Dean of the Graduate School or members of the faculty in the major department. (The constitution and procedure of the judicial board are detailed below.)

E. The Director of Graduate Studies in the student's major department may request that a student's actions be reviewed by the Judicial Board or by the Dean of the Graduate School.

II. The Graduate School Judicial Board

A. *Composition.* The Graduate School Judicial Board shall have five members, serving for a period of two years: two students selected from the student body, two members of the Graduate Faculty appointed by the Executive Committee of the Graduate School, and one Associate or Assistant Dean appointed by the Dean of the Graduate School. The Board shall elect one of its members as Chairman. The Board shall have at its service a recording secretary to keep minutes of the hearings and of the Board's actions in a permanent, confidential record book. The Board will be constituted in order to hear cases in which the accused is a student currently enrolled in the Graduate School and which have been referred to it by the Director of Graduate Studies in the student's department, by the Dean of the Graduate School, or by the student himself.

B. *Preliminary Procedures.* If a student requests a hearing by the Judicial Board it must be done in writing, allowing its Chairman at least seventy-two hours to convene the Board. In addition, the Chairman shall not convene the Board until seventy-two hours after being asked to convene the Board. It is the responsibility of the Chairman of the Judicial Board fully to inform its members concerning the case and the reasons the case has been referred to the Board; and to prepare a written summary of this information for the Board, the Dean, and the student.

C. *Procedural Safeguards for the Hearing.* The Accused has the right to challenge any member of the Judicial Board on grounds of prejudice. If the Board decides to excuse one or more of its members for reasons given

by the Accused, it shall consult with the Dean about the need for replacements. The Accused may choose an Adviser to assist in the defense. The Accused may also produce witnesses (including no more than two character witnesses), introduce documents, and offer testimony. A person having direct knowledge relevant to a case being heard by the Board is a material witness. The Judicial Board may request the appearance of material witnesses. The Board shall also request, upon written request of the Complainant or the Accused, the appearance of material witnesses. Witnesses shall be notified of the time, place, and purpose of their appearance. The Accused has the right to examine the written statement of any witness relevant to the case at least seventy-two hours before the hearing. The Accused has the right to be faced with any witness who has given a statement relevant to the case at the hearing if the witness's attendance can be secured.

The hearing will be conducted in private unless the Accused requests an open hearing. If any objection is raised to conducting an open hearing in any particular case, the Judicial Board shall decide the issue by majority vote. If the decision is made not to hold an open hearing, the Accused shall be informed in writing of the reasons for the decision.

The Judicial Board shall consider only the report of the Chairman, documents submitted into evidence, and the testimony of witnesses at the hearing in reaching its decisions.

D. Conduct of the Hearing. The hearing of any case shall begin with a reading of the charge by the Chairman in the presence of the Accused. The Accused shall then plead guilty or not guilty or move to terminate or postpone the hearing. The Accused may qualify a plea, admitting guilt in part and denying it in part. The Accused may not be questioned for more than one hour without recess.

At any time during the hearing, the Accused or the Judicial Board may move to terminate or to postpone the hearing or to qualify the plea or to modify its charge.

Pending verdict on charges (including appeal) against the Accused, status as a student shall not be changed, nor the right to be on campus or to attend classes suspended, except that the Chancellor or Provost may impose an interim suspension upon any member of the University community who demonstrates, by conduct, that continued presence on the campus constitutes an immediate threat to the physical well-being or property of members of the University community or the property or orderly functioning of the University.

E. Sanctions and the Verdict. The Graduate School Judicial Board shall have the power to impose the following penalties: expulsion, dismissal from the University with the recommendation that the person never be readmitted; suspension, dismissal from the University and from participation in all University activities for a specified period of time, after which the student may apply for readmission; disciplinary probation, placing the student on a probationary status for a specified period of time, during which conviction for violation of any regulation may result in more serious disciplinary action; restitution, payment for all, or a portion of property damage caused during the commission of an offense. Restitution may be imposed by itself or in addition to any of the other penalties. The Judgment shall consist of a finding of guilty or not guilty of the charge and, when the Accused is found guilty, a statement of the punishment assessed. On all questions, including the verdict and the finding of guilty or not guilty, the Board shall be governed by a majority vote. The Judicial Board may decide to rehear a case in which significant new evidence can be introduced. In addition, the defendant may request an appeal.

F. Appeals. The appellant may submit to the Dean a written statement containing the grounds for appeal and arguments. In such cases, the Dean should determine if the appeal should be granted, and the Dean can hear the case, or refer it to the appropriate faculty in the student's department or to the Judicial Board.

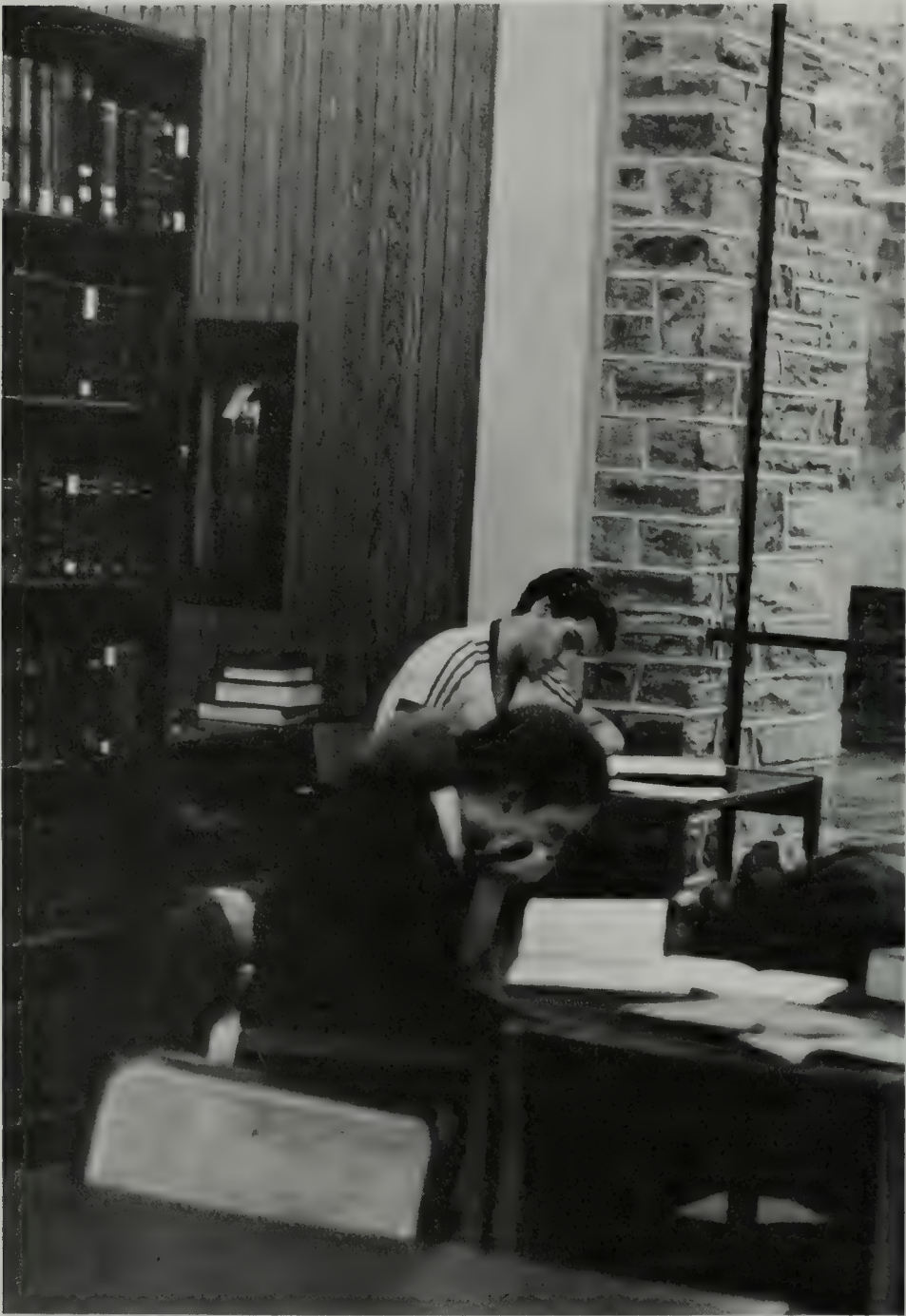
An appeal shall be granted on the following grounds: procedural error substantially affecting the rights of the accused; incompatibility of the verdict with the evidence; excessive penalty not in accord with "current community standards;" new evidence of a character directly to affect the judgment but on which the original tribunal had refused a new hearing.

III. Amendment and Construction

This Judicial code and procedure and this constitution and procedure for the Graduate School Judicial Board may be amended at any time with due notice or publication by consent of the Dean, the Executive Committee, and the graduate students. Questions and problems not answered or anticipated by the foregoing may be resolved by the use of other existing institutions or by amendment.



Courses of Instruction



Course Enrollment

Courses numbered 200-299 are sometimes open to qualified undergraduate students who have received permission of the instructor and the Director of Graduate Studies. Undergraduate students are not permitted in any courses above 300.

In general, courses with odd numbers are offered in the fall semester, those with even numbers in the spring semester. Double numbers separated by a hyphen indicate that the course is a year course and usually must be continued throughout the year if credit is to be received. A student must secure written consent from the instructor in order to receive credit for either semester of a year course. Double numbers separated by a comma indicate that although the course is a year course, credit may be received for either semester without special consent. Ordinarily, courses which bear no date are offered every year.

In each department the number 399 is reserved to designate special (individual) readings in a specified area and supervised by a regular member of the graduate staff, with credit of 1-3 units each registration, only one course per registration, and 9 units maximum in three successive registrations. The course is restricted to resident master's and doctoral programs, must have a completion exercise, and must carry a grade.

The symbol *S*, suffixed to a course number, identifies that course as a seminar.

Anatomy

Professor Robertson, *Chairman* (466 Sands); Professor Moses, *Vice Chairman* (355 Sands); Professor Counce, *Director of Graduate Studies* (356A Sands); Professors Cartmill, Erickson, Hall, Hylander, Kay, Nicklas, Reedy, and Simons; Associate Professors Cant, Corless, Effmann, Longley, MacPhee, McIntosh, and Tyrey; Assistant Professors Bassett, Costello, Crain, Fitzpatrick, Garrett, Jakoi, Lamvik, Lin, Saling, Schachat, and Smith; Professor Emeritus Everett; Associate Professor Emeritus Duke; Associate Medical Research Professors Richardson and Taylor; Assistant Medical Research Professors Beall, Raczkowski, and Schweitzer; Adjunct Assistant Professor Kopf; Lecturer Diamond

The Department of Anatomy offers graduate work leading to the Ph.D. degree. A common focus on the interrelations of biological structure and function characterizes the research of the anatomy faculty, although three general departmental subdivisions are recognized: biophysical, cellular, and molecular biology; neurobiology; and physical anthropology, functional morphology, and primate evolution.

The department offers doctoral training programs designed to produce teachers and research scientists competent in a broad range of the anatomical sciences, and students with a wide variety of backgrounds and interests in the biological sciences can be accommodated within the Ph.D. program. A reading knowledge of one foreign language is

required of all doctoral students in anatomy. All students participate in the core anatomical science courses (Anatomy 305, 307, 309) and gain experience in teaching over the range of departmental interests. The anatomy department is also a participating member of several interdisciplinary training programs, such as those in genetics, cell and molecular biology, neurobiology, pharmacology, and biological systems. All students are encouraged to round out their training by drawing upon anatomy courses as well as those offered by other departments in the University. Laboratories within the department are equipped for and actively support research in several areas. For further information contact the Director of Graduate Studies.

219. Molecular and Cellular Bases of Differentiation. A multidisciplinary approach stressing the molecular, cellular, and genetic processes involved in differentiation in eukaryotes. C-L: Biochemistry 219, Microbiology and Immunology 219, Pathology 219, and Physiology 230. 3 units. *Counce and staff*

225. Neurobiology of Sensory Systems. This interdisciplinary course will focus on several principles involved in the structure, biochemistry, and electro-physiology of sensory systems. The major focus will be in the visual system with lesser emphasis on auditory, gustatory, olfactory, and somatic-sensory (pain, touch, pressure) systems. The systems will be examined from the receptor to the cortical levels. Instructors: participating faculty from the Departments of Anatomy, Ophthalmology, Psychiatry, Physiology, and Psychology. Prerequisites: Anatomy 201, 202 and Physiology 200, 201, their equivalents, or consent of instructor. C-L: Physiology 225. 3 units. *Corless, Simon, and staff*

246S. The Primate Fossil Record. Evolution of humans and other primates as inferred from fossil remains. Prerequisite: a course in human evolution. C-L: Anthropology 246S. 3 units. *Simons*

259. Molecular Biology I: Protein and Membrane Structure/Function. See C-L: The University Program in Cell and Molecular Biology; also C-L: Biochemistry 259 and Microbiology and Immunology 259. 3 units. *Erickson and staff*

266S. Comparative Neurobiology. See C-L: Psychology 266S. 3 units. *Diamond and W. C. Hall*

269. Advanced Cell Biology. See C-L: Zoology 269; also C-L: Botany 269, Microbiology and Immunology 269, and The University Program in Cell and Molecular Biology. 3 units. *McIntosh and staff*

286. Electron Microscopy and Related Techniques. Lectures and laboratories on methods of ultrastructure research. Fundamentals of optics; the light microscope, phase, polarizing, and interference microscopy. Basics of electron microscopy, staining, sectioning, and replication techniques. Optical and computer image processing. Introduction to X-ray diffraction theory and apparatus in biological structure determination. Prerequisites: calculus and one year each of physics and general chemistry or consent of instructor. Offered in alternate years or on demand. 4 units. *Longley*

292. Topics in Morphology and Evolution. Various aspects of vertebrate morphology and evolution will be discussed. Specific focus will vary from year to year, but topics will include major historical approaches to the interpretation of morphology; the evolution, development, and function of specific morphological structures; and patterns of vertebrate evolution. Prerequisite: consent of instructor. 1-3 units. *Smith*

301. Anatomy of the Limbs. This course concentrates on the musculoskeletal anatomy of the limbs and limb girdles. Emphasis is on detailed dissection of the extremities, with a minor focus on clinical applications. Course primarily intended for advanced graduate students in physical therapy. Prerequisite: consent of instructor. 1-3 units. *MacPhee*

305. Gross Human Anatomy. Includes complete dissection of a cadaver; laboratory work is supplemented by conferences which place emphasis upon biological and evolutionary aspects. Prerequisites: adequate background in biology, including comparative anatomy and embryology and written consent of instructor. Required of entering graduate students in anatomy; by arrangement, may extend into second semester. 3 units. *Staff*

307. Microscopic Anatomy. Lectures on structural organization of different tissues and organs, as determined by light and electron microscopy, with emphasis on the relation of structure to function at the cellular level. The laboratory provides practical experience with light microscopy, studying and analyzing our extensive slide collection of mammalian tissues. 3 units. *McIntosh and staff*

309. Basic Neurobiology. (Previously cross-listed Physiology 201.) An integrated interdepartmental course designed for first year medical students and other professional students who need a core course on the morphology and functions of the mammalian nervous system. Lectures, laboratory demonstrations, clinical conferences, and lecture conferences during the month of January only. Prerequisites: Anatomy 305 and 307, Biochemistry 200, and Physiology 200 or equivalents. C-L: Physiology 202. 4 units. *Hall, Somjen, and staff*

310. Frontiers in Neurobiology. Course consists of readings and student and faculty presentations of current problems in neurobiology. Prerequisite: consent of instructors. 3 units. *Cant, Lin, and Hall*

312. Research. Individual investigations in the various fields of anatomy. Laboratories in which a student may work include: three electron microscopy laboratories headed by Moses, Reedy, and Robertson with emphasis respectively on the fine structure and cell biology of chromosomes and associated structures, molecular structure and function of muscle, and biophysical studies of cell membranes and nervous tissue; physical anthropology laboratories and the primate facility under Simons, Cartmill, Hylander, MacPhee, Kay, and Smith concentrating on biomechanics, cytogenetics, comparative anatomy, and primate evolution and behavior; neuroanatomy laboratories under Hall, Cant, Lin, and Diamond emphasizing structural correlates of behavior and learning; neuroendocrinology laboratories under Everett and Tyrey with emphasis on brain mechanisms regulating reproductive functions of the pituitary gland; developmental and cellular biology laboratories under Counce with emphasis on developmental genetics of dipteran embryos, under Jakoi with emphasis on mechanisms for cell surface differentiation, and under Schachat with emphasis on muscle biochemistry and development; and molecular structure laboratories under Longley, Erickson, Taylor, and Corless using a combination of electron microscopy, X-ray diffraction, and optical and computer methods of image analysis to study respectively fibrous proteins, microtubules, and photoreceptor membranes. Prerequisite: consent of instructor. Credit to be arranged; maximum 6 units. *Staff*

313, 314. Anatomy Seminar. Regular meeting of graduate students and staff in which current research problems in anatomy will be presented. 1 unit each. *Staff*

340. Tutorial in Advanced Anatomy. Topics for intensive reading and discussion will be chosen according to the student's interests, related to basic problems in biophysics, cytology, endocrinological control, growth and development, neuroanatomy, physical differentiation, and evolutionary origins of functional microsystems. Prerequisite: consent of instructor. Enrollment: maximum 8. Variable units. *Staff*

354. Research Techniques in Anatomy. A preceptorial course in various research methods in anatomy. An interested student might engage in research in one of the following: anthropology, electron microscopy, X-ray diffraction, chromosome analysis, developmental biology, primate behavior, primate anatomy, and stereotactic approaches

to neuroendocrinology and neuroanatomy. Other topics may be arranged. Prerequisite: consent of instructor. Credit to be arranged. *Staff*

370. Neurobiology I. See C-L: Pharmacology 370; also C-L: Physiology 370. 3 units. *Moore and staff*

418. Reproductive Biology. The lecture material in each section of the course is followed by seminar presentations which will contribute to Anatomy 424, a corequisite for the course. See C-L: Physiology 418. 2 units. *Tyrey, Anderson, and Schomberg*

424. Seminar in Reproductive Biology. Can be taken independently or corequisite with Anatomy 418. See C-L: Physiology 424. 1 unit. *Anderson, Schomberg, and Tyrey*

COURSES CURRENTLY UNSCHEDULED

219S. Seminar

220. Developmental Biology

238. Functional and Evolutionary Morphology of Primates

288S. The Cell in Development and Heredity

302. Advanced Topics and Research Seminar in Smooth and Striated Muscle

Anthropology

Associate Professor Glander, *Chairman* (114 Social Sciences); Associate Professor Smith, *Director of Graduate Studies* (125 Social Sciences); Professors Cartmill, Fox, O'Barr, and Simons; Associate Professors Apte, Domínguez, Quinn, and Smith; Assistant Professor Wright; Professor Emerita Friedl; Professor Emeritus La Barre; Adjunct Associate Professors Kay and Stack

The department offers graduate work leading to the Ph.D. degree in anthropology. Applicants for admission should submit scores on the Graduate Record Examination Aptitude Test. Admission to the program is not contingent on previous anthropological course work or any other specific program of study at the undergraduate level.

The department offers a program of specialization in social/cultural anthropology and a program of specialization in physical anthropology. The emphasis of the social/cultural anthropology program is the application of a theoretical and comparative perspective to research in complex societies. Within this perspective, a wide range of interests is represented in the department. The emphasis of the physical anthropology program is primate evolution; areas of concentration include comparative morphology of human and nonhuman primates and primate social behavior.

Curriculum is tailored to the individual student's background, academic needs, and research goals; pursuit of relevant cross-disciplinary study, within and outside the department, is expected. However, a modest number of courses is required of students in both programs. A reading knowledge of one foreign language is required of all doctoral students in anthropology. Candidates for the Ph.D. degree must demonstrate competence in their chosen subfield of specialization and knowledge of the broad theoretical perspectives, from all relevant disciplines, which inform their area of concentration.

Further details of the graduate program in anthropology, the departmental facilities, the staff, and various stipends available are described in the *Guidelines for Graduate Students in Anthropology* which may be obtained from the Director of Graduate Studies, Department of Anthropology.

For Seniors and Graduates

201S. Marxism and Anthropology. The interaction of Marxist and anthropological theory over the last half century; particular attention to evolution, historical transfor-

mation, mode of production, labor processes, culture, ideology, and consciousness. 3 units. *Smith*

204S. The Anthropology of Cities. Organization and behavior in urban centers from an evolutionary perspective; cross-cultural analysis of cities. Prerequisite: Anthropology 94. 3 units. *Fox or Smith*

206S. Current Theoretical Schools in Anthropology. The theoretical schools since World War II, including cultural materialism and neo-Marxism, structuralism, cognitive anthropology, cultural analysis and symbolic anthropology, transactional analysis, and sociobiology. Prerequisite: Anthropology 94 or graduate standing or permission of instructor. 3 units. *Apte, Domínguez, Fox, O'Barr, Quinn, or Smith*

211S. Ethnography of Communication. History of the mutual influence of linguistics and anthropology leading to the development of ethnography of speaking, ethno-science, structuralism, and sociolinguistics. Topics vary each semester. Prerequisite: Anthropology 111 or 119 or consent of instructor. 3 units. *Apte, Domínguez, or O'Barr*

215S. The Anthropology of Women: Theoretical Issues. Topic to be selected each semester from: gender ideology, women and work, gender inequality, the history of feminist anthropology, or others. C-L: Women's Studies. 3 units. *Domínguez, Quinn, or Smith*

228S. Slavery and Society. Western and non-Western systems of slavery and their effects on social organization, self-concepts, and race relations. 3 units. *Domínguez*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: History 234S and Sociology 234S. 3 units. *Bergquist, Fox, Gereffi, or Smith*

239. Culture and Ideology. Major theories about the relationship between ideologies and social/economic systems. Readings from the works of Marx, Weber, Gramsci, Althusser, Geertz, and others. 3 units. *Fox or Smith*

241. The Rise of Civilization in Mesopotamia and Iran. An introductory survey of the major stages of development from the beginnings of agriculture to the collapse of the early state-system (10,000-1,800 B.C.E.). Archaeological and textual evidence, focusing on the rise of the Mesopotamian state-system, the nature of that system, and the mechanisms leading to its collapse. 3 units. *Staff*

243S. Theory and Method in Archaeology. Techniques of geochronology, environmental reconstruction, sociocultural reconstruction, and statistical analyses applied to problem areas in archaeology. Prerequisite: Anthropology 166 or consent of instructor. 3 units. *Staff*

244S. Primate Behavior. Social behavior of prosimians, monkeys, and apes and the evolutionary development of primates. 3 units. *Glander*

246S. The Primate Fossil Record. Evolution of humans and other primates as inferred from fossil remains. Prerequisite: a course in human evolution. C-L: Anatomy 246S. 3 units. *Simons*

251S. American Marriage: A Cultural Approach. Individual research on the American cultural model of marriage. Collection, transcription, and analysis of how individuals adapt it to understanding their own experiences. 3 units. *Quinn*

255S. Heroes and Heroics: Culture and the Individual. Can great men or women change the course of cultures? Or are even those we call geniuses and heroes simply carriers of their culture? The relationship between individuals and their cultures as portrayed in anthropology and related disciplines. Various approaches to the lives of selected heroes, using M. K. Gandhi as an exemplar. 3 units. *Fox*

258S. Symbols in Society. Symbolic action and expressive culture among tribal, peasant, and industrial societies. Approaches emphasized are functionalism, symbolic interaction, structuralism, and cultural interpretation. 3 units. *Apte or Domínguez*

267. Cognitive Anthropology. The organization of culturally shared knowledge; cognitive tasks such as categorizing, decision making, problem solving, and reasoning. 3 units. *Quinn*

272S. Marxism and Feminism. Introduction to the theoretical literature and debates linking Marxism and Feminism. Prerequisite: consent of instructor. C-L: Women's Studies. 3 units. *Smith*

280S, 281S. Seminar in Selected Topics. Special topics in methodology, theory, or area. Prerequisite: consent of instructor. 6 units. *Staff*

282S. Canada. See C-L: Political Science 282S; also C-L: History 282S and Sociology 282S. 3 units. *Leach*

For Graduates

330S, 331S. Theories in Sociocultural Anthropology. A two-semester seminar in anthropological theory, in which the modern currents and debates in the field are examined and discussed. Particular topics to be chosen by the instructors. 6 units. *Staff*

393. Individual Research in Anthropology. Supervision and guidance of A.M. thesis preparation, Ph.D. dissertation preparation, or other intensive research on a selected problem. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

205. The Anthropology of Anthropology

237S. Interpretations of Kinship

275S. Inequality in Precapitalist Societies

334. Topics in Physical Anthropology

Art and Art History

Professor Goffen, *Chairman*; Professor Spencer, *Director of Graduate Studies* (112A East Duke); Associate Professors Bruzelius and Wharton; Assistant Professors Castriota and Sund; Professor Emeritus Markman

Graduate work in the Department of Art and Art History is offered leading to the A.M. degree in art history and is designed to provide basic training in the history of art with specialization in a given field selected by the student after consultation with and approval by the Director of Graduate Studies. Prospective students should present a minimum of 24 semester hours of undergraduate work in the history of art. In special cases a student who does not fulfill this prerequisite may be required to attend prescribed undergraduate courses. A reading knowledge of one foreign language (preferably German) is required; candidates who do not meet this requirement upon admission to the program are expected to do so by the end of their first term in residence.

The program for the A.M. degree in art history consists of 30 units as follows: 12 units in art history; 6 units in an approved minor; 6 units in the major or minor, or other approved subject; and 6 units in thesis. A written thesis is required.

For Seniors and Graduates

220S. Studies in Greek Art. Specific aspects of the art or architecture in the Greek world from the late geometric to the Hellenistic periods. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Classical Studies 220S. 3 units. *Castriota*

221S. Studies in Roman Art. Selected topics in the art and architecture of Late Republican and Imperial Rome. Prerequisite: consent of instructor. C-L: Classical Studies 227S. 3 units. *Castriota*

222S. Greek Sculpture. C-L: Classical Studies 231S. 3 units. *Stanley*

223S. Greek Painting. C-L: Classical Studies 232S. 3 units. *Stanley*

224S. Greek Architecture. 3 units. *Richardson*

225S. Roman Architecture. See C-L: Classical Studies 235S. 3 units. *Richardson*

226S. Roman Painting. C-L: Classical Studies 236S. 3 units. *Richardson*

230S. Medieval and Byzantine Art and Architecture. Conceptual, institutional, or stylistic topics. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Classical Studies 230S and Medieval and Renaissance Studies. 3 units. *Bruzelius or Epstein*

232S. Romanesque and Gothic Art and Architecture. Analysis of an individual topic. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. 3 units. *Bruzelius*

234. Medieval Architecture. The development of medieval architecture through the mid-fourteenth century. Emphasis on churches, with some discussion of castles and fortifications, town planning, and domestic architecture. 3 units. *Bruzelius*

235. Gothic Cathedrals. Major monuments of Gothic architecture in the twelfth and thirteenth centuries on the continent and in England with concentration on the great cathedrals of France. 3 units. *Bruzelius*

241. Fifteenth-Century Italian Art. Painting, sculpture, and architecture from Masaccio, Donatello, and Brunelleschi to Leonardo. Emphasis on the art of Florence. 3 units. *Goffen or Spencer*

242S. Studies in Italian Renaissance Art. Specific problems dealing with iconography, style, or an individual master from ca. 1300 to 1600. Subject varies from year to year. Prerequisite: consent of instructor. C-L: Medieval and Renaissance Studies. 3 units. *Goffen or Spencer*

243S. Studies in Northern Art. Selected topics such as the Antwerp workshops of the sixteenth century, picturing in Haarlem at the turn of the seventeenth century, or Rubens and Rembrandt. C-L: Medieval and Renaissance Studies. 3 units. *Staff*

251. Italian Baroque Art. Seventeenth-century painting, sculpture, and architecture. 3 units. *Staff*

252. Northern Baroque Painting. Seventeenth-century Flemish and Dutch painting, with emphasis on the art of Rubens and Rembrandt. 3 units. *Staff*

261S. Studies in Romanticism. Examination of the work of a single artist or the development of a specific theme or movement within the period 1760 to 1850. 3 units. *Staff*

262S. Studies in Nineteenth-Century Art. Focus on a major artist, movement, or trend in nineteenth-century art. Prerequisite: consent of instructor. 3 units. *Sund*

274. The History of Impressionism. The evolution of the impressionist movement and the works of its major masters. Particular attention will be paid to Monet, Degas, Cézanne, Pissarro, and Renoir. 3 units. *Sund*

275. Surrealism. The surrealist movement that flourished in Paris between the World Wars; its origins, aims, and major adherents—such as the artists Miró, Magritte, Tanguy, and Dalí—examined in the context of surrealist literature, theory, and politics. 3 units. *Sund*

276S. Problems in Modern Art. Selected topics in modern art before 1945, with emphasis on major movements or masters. Prerequisite: consent of instructor. 3 units. *Sund*

278. Twentieth-Century Criticism. Twentieth-century art through the writings of its major proponents from Apollinaire and Roger Fry through Meyer, Schapiro, and Clement Greenberg to present-day theorists of postmodernism. The definition of modernism and the role of the critic as advocate, mediator, arbiter, and prophet of contemporary trends. 3 units. *Staff*

282S. Contemporary Theory in the Visual Arts. Theory in contemporary history and its accommodation to theoretical developments in other disciplines (for example, literature, women's studies, Marxism, and anthropology). Focus on the writings of contemporary, theory-centered art historians and critics. Prerequisite: consent of instructor. 3 units. *Wharton*

293S. Methods in Art History. Approaches to the study of works of art, including connoisseurship, iconology, and stylistic analysis. Open to art majors, seniors, and qualified juniors only. 3 units. *Staff*

294, 295. Special Problems in Art History. Individual study and research. 6 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

227. Early Christian Culture: Evidence of Art and Literature

231. Byzantine Art and Architecture

240. Italian Art

245. Sixteenth-Century Italian Art

248. Art of Northern Europe in the Fifteenth and Sixteenth Centuries

249. Death in Art

277S. Contemporary Art

279S. Problems in Modern Architecture

Asian Languages

The courses are offered as an enrichment for students interested in the South Asian subcontinent and may be taken as a general elective by advanced undergraduate students. No major work is offered in Hindi-Urdu.

COURSES CURRENTLY UNSCHEDULED

Hindi-Urdu 200, 201. Special Studies in South Asian Languages

For courses in Chinese and Japanese, see *Bulletin of Duke University: Undergraduate Instruction*.

Biochemistry

Professor Hill, *Chairman* (255 Nanaline H. Duke); Professor Webster, *Director of Graduate Studies* (157-B Nanaline H. Duke); Professors Bell, Bennett, Fridovich, Gross, Guild, Kamin, Kredich, Lefkowitz, McCarty, Modrich, Rajagopalan, Siegel, and Spicer; Associate Professors Greene, Greenleaf, Hsieh, B. Kaufman, D. Richardson, Sage, Steege, and Sullivan; Assistant Professors Been, Blackshear, Fierke, Hershfield, R. Kaufman, and Schlossman; Professor Emeritus Bernheim; Associate Medical Research Professor J. Richardson

Graduate work in the Department of Biochemistry is offered leading to the Ph.D. degree. Preparation for such graduate study may take diverse forms. Undergraduate majors in chemistry, biology, mathematics, or physics are welcome, but adequate preparation in chemistry is essential. Graduate specialization areas include protein structure and function, crystallography of macromolecules, nucleic acid structure and function, lipid biochemistry, membrane structure and function, molecular genetics, enzyme mechanisms, and neurochemistry. The Biochemistry department, in cooperation with the University Programs in Genetics and in Cell and Molecular Biology, offers biochemistry students the opportunity to pursue advanced research and study to fulfill the requirements for the Ph.D. degree related to these fields.

200. General Biochemistry. An introductory survey of fundamental aspects of biochemistry with emphasis on the structure of macromolecules, mechanism of enzyme action, metabolic pathways, biochemical genetics, and the structure and functions of special tissues. Designed for medical students; graduate students only with consent of instructor. 4 units. *Hill and staff*

209, 210. Independent Study. A tutorial designed for students who are interested in either a laboratory or a library project in biochemistry. C-L: Marine Sciences. Credit to be arranged. *Staff*

215. Genetic Mechanisms. Genetic mechanisms in molecular terms emphasizing gene function, segregation, and regulation in procaryotes and eucaryotes. Systems covered include bacterial viruses, bacteria, plasmids, cellular organelles, and selected lower and higher eucaryotes. Prerequisite: introductory biochemistry. Course material will be drawn from original literature. 3 units. *Webster and staff*

219. Molecular and Cellular Bases of Differentiation. See C-L: Anatomy 219; also C-L: Microbiology and Immunology 219, Pathology 219, and Physiology 230. 3 units. *McCarty and staff*

219S. Seminar. Optional seminar in conjunction with Biochemistry 219. *McCarty*

222. Structure of Biological Macromolecules. Introduction to the techniques of structure determination by X-ray crystallography and study of some biological macromolecules whose three-dimensional structures have been determined at high resolution. 2 units. *Richardson*

224. Biochemistry of Development and Differentiation. The course represents an extension of topics covered in the first semester course, Biochemistry 219. Emphasis will be on the control of transcription and translation of messenger RNA in mammalian cells. These studies include gene amplification, postsynthetic modifications of chromosomal proteins, as a result of hormone induction. Specific systems will include the development of the mammary gland, the pancreas, and the chick oviduct. 2 units. *McCarty*

227. Introductory Biochemistry I: Intermediary Metabolism. Prerequisite: organic chemistry. See C-L: Botany 227. 3 units. *Fridovich and Rajagopalan*

259. Molecular Biology I: Protein and Membrane Structure/Function. Detailed concepts of the structure and function of proteins as enzymes and as structural elements of cellular substructures, including: protein primary structure and its determination, patterns of protein folding, mechanisms of enzyme catalysis and regulation, function and formation of multimeric protein assemblies, proteins and other constituents of biological membranes. Prerequisite: introductory biochemistry or consent of instructor. C-L: Anatomy 259, Microbiology and Immunology 259, and The University Program in Cell and Molecular Biology. 3 units. *Staff*

265S, 266S. Seminar. Topics and instructors announced each semester. C-L: Marine Sciences. 2 units or variable. *Staff*

268. Molecular Biology II: Nucleic Acids. Structure and metabolism of nucleic acids in the context of their biological function in information transfer. Prerequisites: introductory biochemistry, Biochemistry 259, or consent of instructor. C-L: Botany 268, Microbiology and Immunology 268, and The University Program in Cell and Molecular Biology. 4 units. *Modrich and staff*

288. The Carbohydrates and Lipids of Biological Systems. The subjects will be considered in the following two general categories: (a) the relationship between chemical structure and biological function and (b) biosynthesis and catabolism. 2 units. *Kaufman*

291. Physical Biochemistry. Principles of thermodynamics, hydrodynamics, spectroscopy, and X-ray diffraction and scattering are applied to biological systems. Biological molecules and macromolecules in both soluble and crystalline states are discussed. Prerequisite: undergraduate physical chemistry, including solution thermodynamics, kinetics, introductory quantum mechanics, and introductory crystallography. 3 units. *Hsieh and staff*

297. Intermediary Metabolism. Lectures and student presentations on selected topics in the areas of metabolic regulation, bioenergetics, and other subjects of current research interest in metabolism. 3 units. *Siegel and staff*

299. Nutrition. This course examines the experimental basis for the identification and quantification of requirements for calories, macronutrients, and micronutrients (vitamins and minerals); the biochemistry of nutrition with the assessment of nutriture; and the biological effects of deficiency or excess of nutrients. The course seeks to define optimal nutriture and will search for factual bases for common beliefs on nutrition of individuals and populations. Informal lectures and, if possible, student seminars. Prerequisite: a basic biochemistry course or equivalent or consent of instructor. 2 units. *Kamin*

345, 346. Biochemistry Seminar. Required of all biochemistry students. 1 unit each. *Hill*

347, 348. Seminar in Toxicology. A weekly research seminar throughout the year is required of participants in the Toxicology Program. Students, faculty, and invited speakers present their findings. C-L: Pharmacology 347, 348. 1 unit per semester. *Abou-Donia and Lynn*

COURSES CURRENTLY UNSCHEDULED

245L. Macromolecules, Ecology, and Evolution

276. Comparative and Evolutionary Biochemistry

286. Current Topics in Immunochemistry

296. Biological Oxidations

Botany

Professor W. Culberson, *Chairman* (149 Biological Sciences); Professor Boynton, *Director of Graduate Studies* (145 Biological Sciences); Professors Antonovics, Christensen, Osmond, Ramus, Searles, Siedow, Stone, Strain, White, and Wilbur; Associate Professors Knoerr and Schlesinger; Assistant Professors Johnston, Kohorn, Mishler, and Vilgalys; Professors Emeriti Anderson, Billings, Hellmers, Kramer, Naylor, and Philpott; Adjunct Professor C. Culberson; Adjunct Associate Professor Patterson

Graduate work in the Department of Botany is offered leading to the A.M. (nonthesis), M.S. (thesis), and Ph.D. degrees. Students entering the graduate program in botany normally have a broad background in the botanical or biological sciences supplemented

with basic courses in chemistry, mathematics, and physics. Biochemistry and physical chemistry are strongly recommended for students interested in molecular areas, and advanced courses in mathematics are recommended for students in population genetics and ecology. Deficiencies may be corrected by taking appropriate courses during the first year of graduate study.

Students in botany may specialize in a wide variety of areas including anatomy; cellular and molecular biology; evolution; developmental, ecological, molecular, organelle, and population genetics; physiology; community, ecosystem, physiological, and population ecology; marine biology; and the systematics of algae, fungi, lichens, bryophytes, ferns, and flowering plants. Students' programs are tailored to individual needs. A brochure providing detailed information on the botany department is available from the Director of Graduate Studies.

210L. Bryology. Morphological, systematic, and ecological characteristics of mosses and liverworts. 3 units. *Mishler*

212L. Phycology. Morphological and ecological characteristics of common freshwater and marine algae and principles of their classification. 3 units. *Searles*

216L. Biology of Marine Macrophytes. Physiology and ecology of seaweeds, seagrasses, marshgrasses, and mangroves. Biological flux of carbon and nutrients in coastal seas. Ecological consequences of photosynthetic adaptations. Prerequisites: introductory biology and chemistry. Given at Beaufort. C-L: Marine Sciences 216L. 4 units. *Ramus*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis will be placed on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: a course in general ecology. Given at Beaufort. C-L: Forestry and Environmental Studies 218 and Marine Sciences 218. 6 units. *Staff*

221L. Mycology. Survey of the major groups of fungi with emphasis on life history and systematics. Field and laboratory exercises. 3 units. *Vilgalys*

222S. Topics in Advanced Mycology. Current research on fungal evolution, genetics, physiology, and ecology. Prerequisites: Botany 221 or consent of instructor. 3 units. *Vilgalys*

225T, 226T. Special Problems. Students with adequate training may do special work in the fields listed below. Credit to be arranged. 1 to 4 units.

1. Genetics. *Antonovics*
2. Genetics. *Boynton*
3. Ecology. *Christensen*
4. Lichenology. *W. Culbertson*
5. Molecular Botany. *Johnston*
6. Cell Biology. *Kohorn*
7. Bryology and Systematics. *Mishler*
8. Physiological Ecology. *Osmond*
9. Phycology. *Ramus*
10. Ecology. *Schlesinger*
11. Phycology. *Searles*
12. Physiology. *Siedow*
13. Systematics of Flowering Plants. *Stone*
14. Ecology. *Strain*
15. Mycology and Molecular Systematics. *Vilgalys*
16. Anatomy and Morphology of Vascular Plants. *White*
17. Systematics of Vascular Plants. *Wilbur*

227. Introductory Biochemistry I: Intermediary Metabolism. Chemistry of the constituents of proteins, lipids, carbohydrates, and nucleic acids and their metabolic interrelationships. Prerequisite: organic chemistry. C-L: Biochemistry 227. 3 units. *Staff*

232. Microclimatology. See C-L: Forestry and Environmental Studies 232. 3 units. *Knoerr*

234S. Problems in the Philosophy of Biology. Prerequisite: consent of instructor. See C-L: Philosophy 234S; also C-L: Zoology 234S. 3 units. *Brandon (philosophy)*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: introductory biology and one course in animal or plant diversity. C-L: Zoology 237L. 3 units. *Lundberg and Mishler*

242L. Systematics. Principles of vascular plant taxonomy, with practice in identification of the local flora. Lectures, laboratories, and field trips. Prerequisite: one year of biology. 3 units. *Wilbur*

243S. Classification of Angiosperms. The characteristics and phylogenetic relationships of large and important families of angiosperms with emphasis upon the systems of Cronquist and Thorne. Prerequisite: Botany 142L or equivalent. 3 units. *Wilbur*

245L. Plant Diversity. Major groups of the living plants; their evolutionary origins and phylogenetic relationships. Prerequisite: introductory biology. 3 units. *Mishler, Searles, or Wilbur*

246L. Ecology of Plants. Principles of the relationships between plants and their environments. Structures and processes of ecosystems. Laboratory, lectures, and field trips. Prerequisites: introductory biology and one other course in biology. 3 units. *Christensen, Schlesinger, or Strain*

250L,S. Plant Biosystematics. Descriptive and experimental procedures used to assess systematic implications of plant evolution. Laboratory, discussion, and field-oriented problems. Prerequisites: basic courses in systematics and genetics. 3 units. *Vilgalys*

251L. Plant Physiology. The principal physiological processes of plants including respiration, photosynthesis, water relations, and factors associated with plant morphogenesis. Prerequisites: introductory college biology and one year of chemistry; organic chemistry is desirable. 3 units. *Siedow*

253. Biophysical Plant Physiology. Application of physical principles to such processes as ion transport, water relations, and the interconversion of energy in plant cells. Prerequisites: Botany 151L and Mathematics 32 or equivalent. 3 units. *Knoerr or Siedow*

261. Photosynthesis. Principles of plant photosynthesis: developmental, mechanistic, regulatory, and ecological aspects of the photosynthetic process. Prerequisite: Botany 151L or 251L. 3 units. *Siedow*

263L. Tropical Seaweeds. Collection, preservation, description, illustration, and descriptive ecology. Two-week field study. Prerequisite: Botany 145L or equivalent or consent of instructor. C-L: Marine Sciences 263L. 2 units. *Searles*

265L. Physiological Plant Ecology. The physiological approach to interpreting adaptation in plants, with emphasis on terrestrial seed plants. Prerequisites: Botany 146L and 151L or equivalents. 3 units. *Strain*

266. Plant Population Biology. Theoretical, experimental, and field approaches to plant population dynamics; population growth and regulation; effects of density, competition, and predation. 3 units. *Staff*

267L. Community Ecology. Mechanisms that determine the distribution and abundance of plants and animals: geology, climate, physiography, soils, competition, and history. Lectures focus on ecological principles. Seminars and weekend field trips.

Prerequisites: an introductory ecology course and consent of instructor. C-L: Zoology 204L. 3 units. *Christensen and H. Wilbur (zoology)*

268. Molecular Biology II: Nucleic Acids. Structure and metabolism of nucleic acids in the context of their biological function in information transfer. Prerequisites: introductory biochemistry, Molecular Biology I, or consent of instructor. C-L: Biochemistry 268, Microbiology and Immunology 268, The University Program in Cell and Molecular Biology, and The University Program in Genetics. 4 units. *Modrich (biochemistry) and staff*

269. Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Microbiology and Immunology 269, Zoology 269, and The University Program in Cell and Molecular Biology. 3 units. *McClay (zoology) and staff*

272. Biogeochemistry. Processes controlling the circulation of carbon and biochemical elements in natural ecosystems and at the global level, with emphasis on soil and surficial processes. Prerequisite: Chemistry 12, Botany 146L, or equivalent. C-L: Geology 272. 3 units. *Schlesinger*

280. Principles of Genetics. Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisite: introductory biology. C-L: Zoology 280 and The University Program in Genetics 280. 3 units. *Antonovics, Boynton, and Gillham (zoology)*

283. Extrachromosomal Inheritance. Genetics, biochemistry, and molecular biology of the organelles of eukaryotic cells, and cellular symbionts. Prerequisite: introductory genetics. C-L: The University Program in Genetics and Zoology 283. 3 units. *Boynton and Gillham (zoology)*

285S. Ecological Genetics. Interaction of genetics and ecology and its importance in explaining the evolution, diversity, and distribution of plants and animals. Prerequisites: Botany 180 and 286 or equivalents. 3 units. *Antonovics*

286. Evolutionary Mechanisms. Population ecology and population genetics of plants and animals. Fitness concepts, life history evolution, mating systems, genetic divergence, and causes and maintenance of genetic diversity. Prerequisites: Botany 145L/245L or Zoology 74L, and a course in genetics. C-L: The University Program in Genetics and Zoology 286. 3 units. *Antonovics, Uyenoyama, and H. Wilbur (zoology)*

287S. Macroevolution. Evolutionary patterns and processes at and above the species level. Topics include: species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Zoology 287S. 3 units. *Mishler and Roth (zoology)*

293L. Population Biology. Theoretical approach to population genetics, life table mathematics, life cycle evolution in plants and animals, population dynamics, and regulation. Laboratories emphasize experimental methods. Individual projects and weekend field trips. Prerequisites: calculus, ecology, and consent of instructor. C-L: Zoology 293L. 3 units. *Antonovics and H. Wilbur (zoology)*

295S, 296S. Seminar. Credit to be arranged. *Staff*

300. Tropical Biology: An Ecological Approach. Highly intensive, field-oriented course conducted in Costa Rica under auspices of the Organization for Tropical Studies. For additional information refer to the chapter "Special and Cooperative Programs." 6 to 8 units. *Staff*

330L. Environmental Monitoring and Instrumentation. Methods of measuring and monitoring the earth's physical environment with emphasis on water and air resources.

Characteristics and uses of contemporary sensors, measurement and data acquisition systems. Methods of obtaining and processing computer compatible data records. Prerequisite: consent of instructor. C-L: Forestry and Environmental Studies 330L. Spring, on demand. 4 units. *Knoerr*

359, 360. Research in Botany. Individual investigation in the various fields of botany. C-L: Marine Sciences 359, 360. Credit to be arranged. *All members of the graduate staff*

COURSES CURRENTLY UNSCHEDULED

209L. Lichenology

219L. Benthic Marine Algae

243S. Classification of Angiosperms

247L. Plant Ecology

260L. Plant Anatomy

344. Micrometeorology and Biometeorology Seminar

RELATED PROGRAMS

The University Program in Cell and Molecular Biology. Cell and molecular biology courses offered by the botany department are an integral part of this interdepartmental program. Refer to the announcement in this bulletin under Cell and Molecular Biology for descriptions of the following courses: 259. Molecular Biology I—Protein and Membrane Structure/Function and 264. Cell and Molecular Biology Seminar.

The University Program in Genetics. Genetics courses offered by the Botany Department are an integral part of this interdepartmental program. Refer to the announcement in this bulletin under the University Program in Genetics for more information.

The University Program in Marine Sciences. Interdisciplinary programs emphasizing marine botany are available. Refer to the section on the University Program in Marine Sciences.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Central America. Refer to the section on Organization for Tropical Studies in the chapter "Special and Cooperative Programs."

Business Administration

Professor Keller, *Dean* (219W Fuqua School of Business); Professor Bettman, *Director of Graduate Studies* (429E Fuqua School of Business); Professors R. Ashton, Baligh, Burton, Cohen, Forsyth, Laughhunn, Lewin, Naylor, Payne, Sarin, Staelin, and Winkler; Associate Professors A. Ashton, Battle, Breeden, Burke, Edell, Gardner, Huber, Magat, Mazzola, McCann, Ricks, Sheppard, Tsui, and Whaley; Assistant Professors Boulding, Butt, Daniels, Foster, Francis, Gresov, Harvey, Hemler, Kishimoto, Lindahl, McCardle, Moore, Nau, Philbrick, Romanelli, Stephan, and Viswanathan

The Ph.D. in Business Administration program prepares candidates for research and teaching careers at leading educational institutions and for careers in business and governmental organizations where advanced research and analytical capabilities are required. The Ph.D. program places major emphasis on independent inquiry, on the development of competence in research methodology, and on the communication of research results.

The student and his/her faculty committee determine the specific program of study. Each student takes a comprehensive examination at the end of the second year or at the beginning of the third year of residence. The final requirement is the presentation of a dissertation. The Ph.D. program usually requires four years of work beyond the bachelor degree.

Refer to the *Bulletin of Duke University: The Fuqua School of Business* for a complete list of courses and course descriptions.

510. Bayesian Inference and Decision. Methods of Bayesian inference and statistical decision theory, with emphasis on the general approach of modeling inferential and decision-making problems as well as the development of specific procedures for certain classes of problems. Topics include subjective probability, Bayesian inference and prediction, natural-conjugate families of distributions, Bayesian analysis for various processes, Bayesian estimation and hypothesis testing, comparisons with classical methods, decision-making criteria, utility theory, value of information, and sequential decision-making. 3 units. *Winkler*

521. Organization Seminar: A Micro Focus. Individual and small group behavior in organizations. Theories of motivation, decision making, interpersonal behavior, group processes, and leadership. A variety of research approaches and methods includes presentation of behavioral research by members of the Fuqua School of Business and other researchers. 3 units. *Staff*

522. Organization Seminar: A Macro Focus. The organization and the subunits which make up the organization. Theories of organization, structure, decentralization, divisionalization, functional area integration, task design, incentives and rewards, information systems, and decision rules are developed with an orientation toward their choice and design for high performance. Includes presentation of research by members of the Fuqua School of Business and other researchers. 3 units. *Staff*

531. Financial Accounting Seminar. The nature of published financial statement information and its relationship with various economic variables. The list of related variables might include stock market data, bankruptcy filings, and the actions of various users of financial statement information, including management, investors, creditors, and regulators. The focus is on the current research methodologies and research efforts used to analyze the above relationships. A background in masters level accounting and finance is assumed. 3 units. *Staff*

532. Management Accounting Seminar. Information systems and their use in facilitating management decision making and organizational control. Emphasis on the appropriate research methodologies and paradigms including information economics, decision theory, and organizational theory. Topics include budgeting, incentive systems/performance evaluation, variance investigation, and cost allocation. 3 units. *Staff*

551. Corporate Finance Seminar. Introduction to research areas in corporate finance. Emphasis on the research interests of the instructor, and one of the following topics to be explored in depth: capital budgeting, capital structure, mergers and acquisitions, international finance, and cash management. 3 units. *Staff*

552. Investment Seminar. Survey of research in the investment area and exploration in depth of one or more problems in which research is currently active. Emphasis determined by the instructor from one or more of the following areas: valuation of risky securities, capital asset pricing model and extensions, capital market efficiency, portfolio theory, options and warrants, investment management, and futures contracts. 3 units. *Staff*

561. Seminar in Quantitative Research in Marketing. An overview of the quantitative techniques which are important in marketing research. Each model and technique will be examined in considerable detail so as to permit an understanding of its assumptions, structure, and usefulness. Topics covered will include the general data analysis techniques as well as models from advertising, new products, and pricing decisions. 3 units. *Staff*

562. Seminar in Behavioral Models in Marketing. Examines the development of research in consumer behavior. Major emphasis is given to theoretical developments and

empirical research. Students are expected to formulate and test a framework or model of consumer behavior with respect to a marketing problem or topic. 3 units. *Staff*

571. Operations Strategy Seminar. Recent developments in the strategy of operations in both the manufacturing and service sectors. Topics include the focused factory concept, Japanese manufacturing philosophy, technological policy toward new process development and toward new product introduction, vertical integration, choice of capacity and location, industry analysis, and the impact of government regulation. Emphasis on the development of hypotheses about strategic topics and the empirical means by which they can be tested. 3 units. *Staff*

572. Seminar in Operational and Technological Tactics. Current issues in the day-to-day management of manufacturing and service delivery systems. Topics include material requirements planning, capacity requirements planning, quality of work life projects, productivity measurement and enhancement, implementation of new product introductions and production process modifications, quality assurance, production planning and scheduling, and logistics. Concentration on the substance of recent developments, the generation and test of hypotheses about tactical issues, and the applicability of various optimization techniques to the advance of operation tactics. 3 units. *Staff*

597. Dissertation Research. For students actively pursuing research on their dissertation. Prerequisites: student must have passed the preliminary examination and have the consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

598. Independent Study. Allows the doctoral student the opportunity to engage in study or tutorial on special topics on an individual basis under the supervision of a faculty member. Prerequisites: Doctoral Program standing and consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

599. Directed Research. Allows the doctoral student to engage in individual research projects under the supervision of a faculty member. Prerequisites: Doctoral Program standing and consent of the Director of the Doctoral Program and instructor. Credit to be arranged. *Staff*

The University Program in Cell and Molecular Biology

Program Administration: Professor Hill, *Director* (biochemistry); Associate Professor B. Kaufman, *Associate Director* (biochemistry); Professors Erickson (anatomy), McClay (zoology), Modrich (biochemistry), Pizzo (pathology), and Siedow (botany); Associate Professors Caron (physiology) and Keene (microbiology and immunology)

Faculty: A complete list of faculty, including research interests, will be made available to prospective students.

Research training in cell, developmental, and molecular biology is found in eight departments at Duke University: anatomy, biochemistry, botany, microbiology and immunology, pathology, pharmacology, physiology, and zoology. To effectively utilize this broad spectrum of expertise for the training of promising, young scientists while still providing a coherent curriculum, the Duke University Program in Cell and Molecular Biology has been established.

During the first year of doctoral study a student will complete the program's three-course sequence presenting current understanding and research activities in cell biology and the molecular biology of nucleic acids, proteins, and membranes. Each student will also affiliate with a department, fulfill departmental requirements, and choose elective courses in an area of specialization. Research training is stressed throughout the program and dissertation research usually begins by the third semester. Normally the dissertation adviser will be chosen from within the student's own department but,

depending on the student's research interests, dissertation research with an adviser in another department may be approved.

Prospective students may apply directly to the Cell and Molecular Biology Program or to one of the eight participating departments. Those who apply to the program must also designate a departmental preference. Applicants must have demonstrated, in addition to overall academic excellence, a proficiency in the biological and physical sciences. Applications for admission and fellowship support must be received by February 1, but early applications may receive advanced consideration.

259. Molecular Biology I: Protein and Membrane Structure/Function. Detailed concepts of the structure and function of proteins as enzymes and as structural elements of cellular substructures, including: protein primary structure and its determination, patterns of protein folding, mechanisms of enzyme catalysis and regulation, function and formation of multimeric protein assemblies, proteins and other constituents of biological membranes. Prerequisite: introductory biochemistry or consent of instructor. C-L: Anatomy 259, Biochemistry 259, and Microbiology and Immunology 259. 3 units. *Richardson and staff*

264. Cell and Molecular Biology Seminar. Required of all students. Third- and fourth-year students discuss their dissertation research. 1 unit. *Staff*

268. Molecular Biology II: Nucleic Acids. Structure and metabolism of nucleic acids in the context of their biological function in information transfer. Prerequisites: introductory biochemistry, Molecular Biology I, or consent of instructor. C-L: Biochemistry 268, Botany 268, Microbiology and Immunology 268, and The University Program in Genetics. 4 units. *Modrich and staff*

269. Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of designated instructor. C-L: Anatomy 269, Botany 269, Microbiology and Immunology 269, and Zoology 269. 3 units. *McClay and staff*

Chemistry

Professor Arnett, *Chairman* (101 Gross Chemical Laboratory); Professor Baldwin, *Director of Graduate Studies* (373 Gross Chemical Laboratory); Professors Bonk, Chesnut, Crumbliss, Fraser-Reid, Jeffs, Krigbaum, Lochmüller, McPhail, Palmer, Poirier, Porter, Smith, Strobel, Wells, and Wilder; Associate Professors Henkens, McGown, and Shaw; Assistant Professors MacPhail and Polniaszek; Professors Emeriti Bradsher, Hobbs, and Quin; Adjunct Professors Ghirardelli, Millington, Painter, Pitt, and Spielvogel

In the Department of Chemistry graduate work is offered leading to the M.S. and Ph.D. degrees. Before undertaking a graduate program in chemistry, a student should have taken an undergraduate major in chemistry, along with related work in mathematics and physics.

Graduate courses in the department are offered in the fields of analytical, inorganic, organic, and physical chemistry. Research programs are active in all these fields.

A booklet providing detailed information on the department is available from the Director of Graduate Studies.

For Seniors and Graduates

201. Molecular Spectroscopy. Selected spectroscopic methods in the study of molecular structure. Symmetry and group theoretical basis for selection rules, theories of magnetic and optical resonance, and interpretation of spectra; examples from both inorganic and organic chemistry. Three lectures. Prerequisite: consent of department. 1 to 3 units. *Palmer, Smith, and Fraser-Reid*

203. Quantum Chemistry. Basic principles of quantum and group theoretical methods. Topics include symmetry, a review of the fundamentals, and the mathematical foundations of quantum theory. Emphasis on the application of molecular orbital theory to organic and inorganic systems. Prerequisite: Chemistry 162. 1 to 3 units. *Chesnut and Polniaszek*

205. Structure and Reaction Dynamics. Structure and mechanisms in organic and inorganic compounds, substitution reactions, linear free energy relations, and molecular rearrangements. Emphasis on the use of kinetic techniques to solve problems in reaction mechanisms. Three lectures. Prerequisite: consent of department. 1 to 3 units. *Arnett, Crumbliss, and Polniaszek*

207. Principles of Kinetics, Thermodynamics, and Diffraction. Three lectures. Prerequisite: consent of instructor. 1 to 3 units. *Staff*

275, 276. Advanced Studies. (1) Analytical chemistry, (2) inorganic chemistry, (3) organic chemistry, and (4) physical chemistry. Open to especially well-prepared undergraduates by consent of department. 6 units. *McPhail, Smith, or staff*

For Graduates

300. Basic Statistical Mechanics. Fundamentals of quantum and classical statistical mechanics using the ensemble approach. Emphasis on systems of weakly interacting particles with internal degrees of freedom. 3 units. *Poirier or staff*

302. Basic Quantum Mechanics. The fundamentals of quantum mechanics with special emphasis on chemical applications. Topics included are: linear algebra, the uncertainty relations, angular momentum, perturbation theory and time dependent phenomena, molecules in electromagnetic fields, group methods, and electron correlation. 3 units. *Chesnut or staff*

303, 304. Special Topics in Physical Chemistry. Presentation of one or more topics of staff interest such as advanced methods in crystallography, light scattering and small angle X-ray diffraction, application of ESR spectroscopy to chemical problems, electronic spectroscopy of proteins, group theory, intermolecular forces, liquid crystals, methods of determining the rates of elementary steps in reaction kinetics, physical chemistry of aerosols, physical-chemical methods of polymer characterization, structure and bonding in metallo-enzymes, statistical mechanics of fluids, topics in structural chemistry, and triplet excitons. 1 to 3 units each. *Staff*

310. Theoretical and Structural Inorganic Chemistry. An advanced study of theoretical concepts and structural determination techniques as applied to inorganic systems. Areas included are crystal field and ligand field theories; magnetic susceptibility; and electronic, infrared, and Raman spectroscopy. 3 units. *Crumbliss and Palmer*

312. Inorganic Reactions and Mechanisms. Chemistry of main group and transition elements. Emphasis on current developments in synthetic and mechanistic studies of inorganic, organometallic, and organometalloid compounds. 3 units. *Crumbliss and Wells*

313. Special Topics in Inorganic Chemistry. Lectures, oral reports, and discussions on advanced topics and recent advances in the field of inorganic chemistry. Examples of topics which may be discussed are bioinorganic chemistry, fluxional molecules, homogeneous catalysis, synthesis and properties of selected groups of compounds, and new physical methods. 1 to 3 units. *Staff*

320. Synthetic Organic Chemistry. A study of the scope and limitations of the more important types of reactions in synthetic organic chemistry. Some discussion of the

rapidly developing use of transition metals, complex hydrides, and photochemistry will be included. 3 units. *Baldwin, Fraser-Reid, or Polniaszek*

322. Organic Reactive Intermediates. A discussion of reactive intermediates in organic chemistry. Topics will include carbanions, carbenes, carbonium ions, free radicals, photochemical excited states, and other reactive species. 3 units. *Arnett and Porter*

324. Special Topics in Organic Chemistry. Advanced topics and recent developments in the field of organic chemistry. Representative topics include heterocyclic chemistry, natural products chemistry, carbohydrate chemistry, molecular mechanics, and two-dimensional NMR spectroscopy. Lectures and written and oral reports. 1 to 3 units. *Staff*

330. Separation Science and Fundamental Electrochemistry. Section .01, fundamental separation chemistry; section .02, practical aspects of chromatographic separation methods; section .03, fundamentals of electrochemistry. 1 to 3 units. *Lochmüller or Strobel*

331, 332. Special Topics in Analytical Chemistry. An advanced treatment of important areas in modern analysis. Possible topics include: electrochemistry, small computer applications, magnetic resonance, and problem-solving approaches. 1 to 3 units each. *Staff*

334. Chemical Instrumentation and Practical Electrochemistry. Section .01, basic chemical instrumentation; section .02, optical chemical instrumentation; section .03, practical electrochemistry. 1 to 3 units. *McGown or Strobel*

373, 374. Seminar. One unit is required of all Ph.D. candidates in chemistry. One hour a week discussion. 1 unit each. *All members of the graduate staff*

375, 376. Research. The aim of this course is to give instruction in methods used in the investigation of original problems. Individual work and conferences. 1 to 6 units each. *All members of the graduate staff*

377. Research Orientation Seminar. A survey of departmental research. Required of all entering graduate students in chemistry. Prerequisite: consent of Director of Graduate Studies. 1 unit. *All members of the graduate staff*

Classical Studies

Professor Newton, *Chairman* (326 Carr); Associate Professor Rigsby, *Director of Graduate Studies* (327 Carr); Professors Oates and Richardson; Associate Professors Boatwright, Burian, Stanley, and Younger; Professor Emeritus Willis

The Department of Classical Studies offers graduate work leading to the A.M. and Ph.D. degrees in classical studies. Work in the department encompasses all aspects of the Greco-Roman world: students in the program are able, through course work, directed research, and their own teaching, to prepare for careers of teaching and research as broadly trained classical scholars. For regular admission, students should offer at least three years of college study in one of the classical languages and two in the other. Before developing a specialization within the program, students are expected to acquire facility in both Greek and Latin, a broad knowledge of the literatures and of ancient history and archaeology, and command of research methods. Reading knowledge of French and German is required for the Ph.D. The resources of the department include important collections of Greek and Latin manuscripts and papyri, computer facilities in the ancient languages, and a valuable study collection of Greek and Roman art. The department publishes the journal *Greek, Roman, and Byzantine Studies*. The Director of Graduate Studies will provide on request a brochure giving further information about the department's requirements, resources, and financial aid; prospective students should also consult the general requirements of the University set forth in the chapter on "Registration" in this bulletin.

GREEK

For Seniors and Graduates

200. Intensive Survey of Greek Literature I. A chronological and thematic history of Greek literature. Readings in representative texts of the major writers, including the early poets and Classical authors. 3 units. *Staff*

201. Intensive Survey of Greek Literature II. A chronological and thematic history of Greek literature. Readings in representative texts of the major Classical and later authors. 3 units. *Staff*

207. The Dramatists. Readings and studies of selected plays by the major playwrights Aeschylus, Sophocles, Euripides, and Aristophanes. 3 units. *Burian*

211S. Plato. Selected dialogues. C-L: Philosophy 211S. 3 units. *Ferejohn*

217S. Aristotle. Selected topics. C-L: Philosophy 217S. 3 units. *Ferejohn*

222. The Historians. Reading and studies in the major Greek historians Herodotus, Thucydides, and Xenophon. 3 units. *Rigsby*

For Graduates

301. Seminar in Greek Literature I. Selected authors and topics. 3 units. *Burian or Stanley*

302. Seminar in Greek Literature II. Selected authors and topics. 3 units. *Burian or Stanley*

399. Directed Reading and Research. Credit to be arranged. *Staff*

Courses Currently Unscheduled

203. Homer

205. Greek Lyric Poets

221. Early Greek Prose

226. The Orators

313. Proseminar in Greek Epigraphy

321. Seminar in Literary Papyri

LATIN

For Seniors and Graduates

200. Intensive Survey of Latin Literature I. A chronological and thematic history of Latin literature. Readings in representative texts of the major Republican authors. 3 units. *Staff*

201. Intensive Survey of Latin Literature II. A chronological and thematic history of Latin literature. Readings in representative texts of the major authors of the late Republic and Empire. 3 units. *Staff*

207. Vergil's Aeneid. 3 units. *Newton*

For Graduates

301. Seminar in Latin Literature I. Selected authors and topics. 3 units. *Boatwright, Newton, or Richardson*

302. Seminar in Latin Literature II. Selected authors and topics. 3 units. *Boatwright, Newton, or Richardson*

399. Directed Reading and Research. Credit to be arranged. *Staff*

Courses Currently Unscheduled

204. Epic of the Silver Age: Lucan to Statius

205. The Roman Novel

206. Cicero

208. Lyric and Occasional Poetry

211. Elegiac Poets

214. The Historians

221. Medieval Latin

312. Proseminar in Latin Palaeography

314. Proseminar in Latin Epigraphy

315. Proseminar in Roman Law

CLASSICAL STUDIES (ANCIENT HISTORY)

For Seniors and Graduates

223. Alexander and the Hellenistic World. The achievements and legacy of Alexander the Great and the rise of Roman power in the Eastern Mediterranean. C-L: History 261. 3 units. *Oates*

225. The Roman Empire. The foundation, consolidation, and transformation of Roman rule from Augustus to Diocletian. C-L: History 264. 3 units. *Boatwright*

258. The Hellenistic and Roman East. The social and cultural history of the Greco-Roman world, concentrating on papyrological evidence. Prerequisite: knowledge of ancient Greek and Latin. 3 units. *Oates*

For Graduates

321. Seminar in Ancient History I. Selected topics. 3 units. *Oates or Rigsby*

322. Seminar in Ancient History II. Selected topics. 3 units. *Oates or Rigsby*

399. Directed Reading and Research. Credit to be arranged. *Staff*

Courses Currently Unscheduled

221. Archaic Greece

222. Fifth and Fourth Century Greece

224. The Roman Republic

226. Late Antiquity

327. Seminar in Byzantine History

CLASSICAL STUDIES (ARCHAEOLOGY)

For Seniors and Graduates

220S. Studies in Greek Art. Prerequisite: consent of instructor. See C-L: Art 220S. 3 units. *Castriota*

227S. Studies in Roman Art. Prerequisite: consent of instructor. See C-L: Art 221S. 3 units. *Castriota*

230S. Medieval and Byzantine Art and Architecture. Prerequisite: consent of instructor. See C-L: Art 230S; also C-L: Medieval and Renaissance Studies. 3 units. *Wharton*

231S. Greek Sculpture. Techniques and styles of the major schools and personalities in archaic, classical, and Hellenistic free-standing and architectural sculpture. C-L: Art 222S. 3 units. *Stanley or Younger*

233S. Greek Architecture. Development of form and function in the various religious, civic, and domestic building types, from the Bronze Age through the Hellenistic period. C-L: Art 224S. 3 units. *Richardson*

235S. Roman Architecture. Significant monuments chosen to exemplify the Roman genius in building in the late Republic and early Empire. C-L: Art 225S. 3 units. *Boatwright*

236S. Roman Painting. Roman pictorial art with concentration on the wall paintings from Campania. Investigation of techniques, iconography, and the use of pictures in decoration. C-L: Art 226. 3 units. *Richardson*

For Graduates

311. Archaeology Seminar I. Selected topics. 3 units. *Staff*

312. Archaeology Seminar II. Selected topics. 3 units. *Staff*

399. Directed Reading and Research. Credit to be arranged. *Staff*

Courses Currently Unscheduled

232S. Greek Painting

234S. Roman Sculpture

Under the terms of a cooperative agreement, graduate students of Duke University may take any graduate course offered by the Department of Classics of the University of North Carolina. A list of these courses will be sent upon request.

Computer Science

Professor Rose, *Chairman* (206 North); Professor Gallie, *Director of Graduate Studies* (203 North); Professors Biermann, Loveland, Marinos, Patrick, Reif, Starmer, Trivedi, Utku, and Woodbury; Associate Professors C. Ellis, Greenside, Kedem, and Wagner; Assistant Professors Board, Dugan, Gardner, Holliday, Nadathur, and Szyl; Research Associate Professors J. Ellis, Kootsey, and Ramm; Research Assistant Professor J. Rosenberg; Adjunct Professor Voight; Adjunct Associate Professor W. Coughran; Adjunct Assistant Professor McHugh

The Department of Computer Science offers programs leading to the M.S. and Ph.D. degrees. The department also actively cooperates with the Computer Science Department of the University of North Carolina at Chapel Hill.

A student entering graduate work in computer science should have had three semesters of calculus and one semester of linear algebra, and have a knowledge of data structures, and of assembler as well as higher-level computer programming languages.

Research interests of present faculty include mathematical foundations of computer science, artificial intelligence, analysis of algorithms, programming methodology, real-time computing, operating data base systems, computer systems design and analysis, parallel processing systems, scientific computation (including numerical analysis), and very large-scale integration.

Each student should consult the document, *Graduate Degree Requirements of the Computer Science Department*, for degree requirements not listed in this bulletin.

For Seniors and Graduates

200. Programming Methodology I. Practical and theoretical topics including structured programming, specification and documentation of programs, debugging and testing strategies, choice and effective use of programming languages and systems, psychology of computer programming, proof of correctness of programs, analysis of algorithms, and properties of program schemata. Prerequisite: Computer Science 152. 3 units. *J. Rosenberg or Wagner*

201. Programming Languages. Information binding, data structures and storage, control structures, recursion, execution environments, input/output; syntax and semantics of languages; study of PL/1, Fortran, Algol, APL, LISP, SNOBOL, and SIMULA; exercises in programming. Prerequisite: Computer Science 200. 3 units. *Ballard, Holliday, or taught at UNC-CH as Comp 244*

202. Applied Discrete Structures. Aspects of discrete mathematics that are essential to the development of computer science. Topics from combinatorics and graph theory, discrete probability theory, and mathematical logic. Prerequisites: Mathematics 103 and 104 or equivalents. 3 units. *Staff*

204. Computer Network Architecture. Prerequisite: Electrical Engineering 157. See C-L: Electrical Engineering 204. 3 units. *Staff*

207. Fault-Tolerant Computer Systems. See C-L: Electrical Engineering 207. 3 units. *Marinos*

208. Digital Computer Design. See C-L: Electrical Engineering 208. 3 units. *Marinos*

209. Microprocessor Fundamentals and Applications. See C-L: Electrical Engineering 209. 4 units. *Carroll, George, or Marinos*

210. VLSI Systems: An Introduction. A first course in VLSI using the Mead-Conway approach. Topics include (1) the basic components of MOS technology: the transistor and gates constructed therefrom; (2) techniques for composing components into useful logic blocks: array logic, passive logic networks, sequential machines; (3) introduction to techniques for composing logic blocks into systems; and (4) introduction to software systems that aid the design process. Students will complete the design of a small system in NMOS. Prerequisite: Computer Science 157 or equivalent. 3 units. *Kedem or taught at UNC-CH as Comp 268*

212. Introduction to Scientific Computing. Practical introduction for graduate students and faculty to computer resources that facilitate scientific research: scientific word processing (Tex and LaTeX), symbolic manipulation programs, software tools, numerical software packages, and graphics. Case studies used to illustrate these resources. For noncomputer scientists. Prerequisites: Mathematics 103, 104 or equivalent; some programming experience. 3 units. *Gardner or Greenside*

221. Numerical Analysis I. Error analysis, interpolation and spline approximation, numerical differentiation and integration, solutions of linear systems, nonlinear equations, and ordinary differential equations. Prerequisites: knowledge of an algorithmic programming language and intermediate calculus. C-L: Mathematics 221. 3 units. *Gardner, Greenside, Rose, or Szyld*

222. Numerical Differential Equations. Numerical methods for solving ordinary and partial differential equations, emphasizing nonlinear differential equations. Methods for solving ordinary differential equations that generalize to solve partial differential equations: finite difference, spectral, and finite element methods. Solution of hyperbolic, parabolic, and elliptic partial differential equations arising in scientific problems. Prerequisite: Computer Science 221 or equivalent. C-L: Mathematics 222. *Gardner, Greenside, Rose, or Szyl*d

223. Numerical Linear Algebra. Solution of large, sparse linear systems of equations. Storage schemes, graph theory for sparse matrices, different orderings to minimize fill, block factorizations, iterative methods, analysis of different splittings, conjugate gradient methods. Eigenvalue problems, QR factorization, Lanczos method, power method and inverse iteration, Rayleigh quotient. Prerequisite: Computer Science 221 or equivalent. C-L: Mathematics 223. 3 units. *Gardner, Greenside, Rose, or Szyl*d

224. Analysis of Algorithms. Design and analysis of efficient algorithms. Design techniques include recursion, divide-and-conquer, and dynamic programming. Applications include sorting, searching, dynamic structures, path-finding, fast multiplication, fast Fourier transform. Nondeterministic algorithms. Computationally hard problems. NP-completeness. Prerequisites: Computer Science 152 and four semesters of college mathematics. 3 units. *Loveland or Reif*

225. Formal Languages and Theory of Computation. An introduction to the study of abstract machines and the languages they define, their capabilities and limitations. Finite-state automata, regular languages, pushdown automata, context-free languages, Turing machines, recursive functions and recursively enumerable sets, noncomputable sets, measures of complexity for algorithms. Prerequisites: four semesters of undergraduate mathematics. 3 units. *Loveland or Reif*

226. Mathematical Methods for Systems Analysis I. Basic concepts and techniques used in the stochastic modeling of systems. Elements of probability, statistics, queuing theory, and simulation. Prerequisites: four semesters of college mathematics. 3 units. *Trivedi*

227. Mathematical Methods for Systems Analysis II. Basic concepts and techniques used in the deterministic modeling of systems. Elements of linear algebra; linear, integer, dynamic, and geometric programming; and unconstrained and constrained optimization. Prerequisites: four semesters of college mathematics. 3 units. *Staff*

231. Introduction to Operating Systems. Basic concepts and principles of multiprogrammed operating systems. Memory, CPU, I/O device management, and scheduling. Buffering techniques. Performance evaluation. Case studies of existing systems. Prerequisite: Computer Science 154. 3 units. *Dugan, C. Ellis, Holliday, or Trivedi*

232. Compiler Construction. Models and techniques used in the design and implementation of assemblers, interpreters, and compilers. Lexical analysis, compilation of arithmetic expressions and simple statements, specifications of syntax, algorithms for syntactic analysis, code generation, and optimization techniques. 3 units. *Wagner*

241. Data Base Methodology. Basic concepts and principles. Relational, hierarchical, and network approaches to data organization; data entry and query language support for data base systems; theories of data organization; security and privacy issues. Prerequisites: Computer Science 154 and either 155 or 163. C-L: Mechanical Engineering and Materials Science 242. 3 units. *C. Ellis or McHugh*

245. Functional Analysis for Scientific Computing. Linear spaces, topologies, norms, and completeness. Focus on Banach and Hilbert spaces including Sobolev spaces. Linear and nonlinear operators. Fréchet derivatives. Iterative methods for nonlinear operator

systems, such as Newton-like methods. Applications. Intended for science and engineering students but not mathematics graduate students. Prerequisite: Computer Science 221. C-L: Mathematics 245. 3 units. *Rose or Szyld*

252. Computer Systems Organization. Hardware and software aspects. Processor, memory, device, and communication subsystems; case studies of hardware system organization, e.g., parallel, associative, fault-tolerant; organization of software systems to exploit hardware systems organization; economic and reliability aspects of various hardware organizations. Prerequisites: Computer Science 154 and 157. C-L: Electrical Engineering 252. 3 units. *J. Ellis or Patrick*

265. Advanced Topics in Computer Science. 3 units. *Staff*

276. Communication, Computation, and Memory in Biological Systems. Communication and memory in biological systems: in voltage sensitive ion channels, hormone-receptor interactions, and initiation and control of RNA/DNA synthesis. Models of signaling and memory are developed and related to electronic signaling schemes. Prerequisites: Computer Science 152, two semesters of college chemistry, and four semesters of college mathematics. 3 units. *Starmer*

For Graduates

308. Advanced Topics in Digital Systems. See C-L: Electrical Engineering 308. 3 units. *Marinos*

310. CMOS VLSI Design. A second course in VLSI, aimed at the design of VLSI systems in CMOS. The main thrusts of the course will be (1) to provide enough background in the theory of CMOS circuits to understand circuit level trade-offs; (2) to introduce a symbolic design system and its supporting software, which greatly aid the design process; (3) to examine sample chip designs with an eye to understanding competitive design methodologies. Students will complete a CMOS-oriented project comprising the design and implementation of either a hardware or a software subsystem. Prerequisite: Computer Science 210 or equivalent. C-L: Electrical Engineering 310. 3 units. *Kedem*

315. Advanced Topics in Artificial Intelligence. Course content will vary from year to year and will include a detailed study of one or more of the following: mechanical theorem proving, natural language processing, automatic program synthesis, machine learning and inference, representations of knowledge, languages for artificial intelligence research, artificial sensorimotor systems, and others. Prerequisite: Computer Science 215. 3 units. *Ballard, Biermann, Loveland, or Nadathur*

316. Computational Linguistics. A historical and technical introduction to the computer processing of English or other natural language inputs, with emphasis on such applications as data base query, programming, and office automation. Topics will include techniques for the morphological, syntactic, semantic, and pragmatic analysis of English. Recent developments in the area will also be studied. Students will write a short paper and/or do a project. Prerequisite: Computer Science 215. 3 units. *Ballard or Biermann*

320. VLSI Algorithmics. Algorithmic and systems aspects of VLSI. Topics include theoretical studies of the layout problem, array logic, placement and routing, fault-tolerance in VLSI designs, design for testability, the design of networks of processors, and cost trade-offs in VLSI designs. Each student will complete an in-depth study of a topic approved by the instructor. Prerequisites: Computer Science 224 and either 210 or 310. 3 units. *Staff*

321. Topics in Numerical Mathematics. Advanced topics in numerical mathematics to be selected from areas of current research. Prerequisites: Computer Science 221 and 222. 3 units. *Gardner, Greenside, Rose, or Szyld*

326. Systems Modeling. Advanced study of analytical models of systems; queuing model and its parameterization and validation. Methods for computer solutions of some models. Prerequisites: Computer Science 226 and 231. 3 units. *Trivedi*

331. Operating Systems Theory. Advanced study of theoretical aspects of operating systems emphasizing models and control of concurrent processes, processor scheduling, and memory management. Prerequisites: Computer Science 226 and 231. 3 units. *C. Ellis, Trivedi, or Wagner*

381. Seminar in Computer Systems Analysis. Topics in computer systems analysis, especially for fault-tolerant systems, including reliability, availability and performance analysis, comparative analysis of architectures, performability, analytic and numerical solution techniques, stochastic Petri nets, simulation. 1 to 3 units. *Dugan or Trivedi*

382. Seminar in Artificial Intelligence. Topics in artificial intelligence, such as natural language understanding, learning, theorem proving and problem solving, search methodologies. Topics will vary from semester to semester. Includes research literature reading with student presentation. 1-3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

301. Topics in Programming Theory

325. Theory of Computation

332. Topics in Operating Systems

SUPPLEMENTARY COURSES OFFERED AT UNC-CH

Comp 145. Software Engineering Laboratory

Comp 171. Natural Language Processing

Comp 230. File Management Systems

Comp 236. Computer Graphics

Comp 238. Raster Graphics

Comp 254. Picture Processing and Pattern Recognition

Comp 265. Architecture of Computers

Economics

Professor Vernon, *Chairman* (215A Social Sciences); Professor Wallace, *Director of Graduate Studies* (238 Social Sciences); Professors Clotfelter, Coats, Cook, Davies, de Marchi, Geweke, Gillis, Goodwin, Grabowski, Graham, Havrilesky, Henderson, Kelley, Krueger, Lewis, McElroy, Naylor, Tower, Trembl, and Yohe; Associate Professors Kimbrough and Tauchen; Assistant Professors Baumgardner, Brock, Marshall, Meurer, Stahl, and Zarkin; Adjunct Professors Bates, Gallant, Ladd, and Richard

The Department of Economics offers graduate work leading to the A.M. and Ph.D. degrees. Among the undergraduate courses of distinct advantage to the graduate student in economics are statistics, economic theory, and basic courses in philosophy, mathematics, and social sciences other than economics. Advanced work in mathematics or statistics is also useful.

Requirements for the Ph.D. degree in economics include courses in economic theory, quantitative methods, and econometrics in the first year, and at the end of the second year, an examination in economic analysis. In addition, a student must obtain certification in three fields, one of which may be in an outside minor. The student may

select from advanced economic theory, history of political economy, economic development, economic history, international economics, money and banking, labor economics, public finance, industrial organization, econometrics, statistics, Soviet economics, corporate economics, and certain fields outside the economics department (e.g., demography). Course work for the Ph.D. degree should be completed in five semesters of residence.

For Seniors and Graduates

200. Capitalism and Socialism. Selected ideological classics of new and old, right and left economics including both "counsels for perfection" (utopias) and "precepts for action" in political economy. Prerequisites: Economics 149 and 154 or consent of instructor. 3 units. *Naylor*

204S. Advanced Monetary Economics. Monetary theory and its statistical and institutional implementation. Particular attention to the development of aggregative theories of prices, interest rates, and production; the functioning of monetary policy within various theoretical frameworks; appraisal of recent use and limitations of Federal Reserve policy. Prerequisite: Economics 153. 3 units. *Havrilesky or Yohe*

205S. Advanced Monetary Theory and Policy. Emphasis on recent issues: innovations in the payments mechanism and new monetary aggregates, the subterranean economy, financial crises, alternative views of the monetary policy transmission mechanism, and the monetarist-fiscalist controversy. Prerequisites: Economics 138 and 153. 3 units. *Havrilesky or Yohe*

212S. Economic Science and Economic Policy. A historical examination of the impact of economics on public policy; topics vary each semester and have included energy and anti-inflation policy, productivity growth, the Third World, and the Council of Economic Advisers. 3 units. *Goodwin*

213S.1. The Economics of Slavery in the American South. The nature, development, economics, and social consequences of slavery in the United States during the nineteenth century. Prerequisites: Economics 149 and consent of instructor. 3 units. *Coats*

214. Social Choice. The economic study of nonmarket decision making. Theory of constitutions, voting rules, voter behavior, the bureaucracy, incentives for reaching consensus, and the evolution of cooperation. Applications to the provision of public goods, and tax policy and redistribution. Available only in the Duke in Amsterdam Summer Program. Prerequisites: Economics 1 or 51, 2 or 52. 3 units. *de Marchi*

214S. Social Choice. A seminar version of 214. Prerequisites: Economics 149 and consent of instructor. 3 units. *de Marchi*

218. Macroeconomic Policy. Does not count for economics major requirements. See C-L: Public Policy Studies 218. 3 units. *Staff*

219S. Economic Problems of Underdeveloped Areas. Analysis of underdeveloped countries with some attention to national and international programs designed to accelerate development. Prerequisite: Economics 149 or consent of instructor. 3 units. *Brock, Kelley, or Krueger*

232. Microeconomics: Policy Applications. Does not count for economics major requirements. See C-L: Public Policy Studies 232. 3 units. *Gillis*

233. Federal, State, and Local Finance and Economic Policies. Analysis of expenditures, taxation, debt, public enterprises, and current government programs. Prerequisite: Economics 149 or consent of instructor. 3 units. *Davies*

239. Introduction to Econometrics. Data collection, estimation, and hypothesis testing. Use of econometric models for analysis and policy. (Not open to students who have had Economics 139.) Prerequisites: Economics 2 or 52 and Mathematics 32 or equivalent and Economics 138 or equivalent. 3 units. *Marshall, McElroy, Tauchen, or Wallace*

243. Econometrics I. Economic theory, mathematics, statistical inference, and electronic computers applied to analysis of economic phenomena. Objective is to give empirical content to economic theory. Matrix algebra used to develop topics in inference, linear regression, and systems of simultaneous equations. Use is made of the electronic computer. Prerequisites: Economics 149 and 237 or equivalents. 3 units. *Geweke, Marshall, McElroy, Tauchen, or Wallace*

244. Corporate Economics I. Strategic planning models of the firm including marginal analysis, mathematical programming, portfolio, and corporate simulation models. Economics as the language of corporate planning and modeling. Prerequisites: Economics 138 and 149 or equivalents. 3 units. *Naylor*

245. Econometrics II. Advanced theory and applications: includes specification error, generalized least squares, lag structures, Bayesian decision making, simultaneous equation methods, and forecasting. Emphasis on current applied literature. Prerequisite: Economics 243. 3 units. *McElroy, Tauchen, or Wallace*

246. Selected Topics in Econometric Theory. Analysis of panel data, combining data from different sources, vector autoregressive methods, problems of causation in time series data, nonlinear estimation, limited dependent variables, sample selection bias, and other topics to be chosen subject to the interests of the class. 3 units. *Geweke, Tauchen, or Wallace*

247S. Applied Econometrics. Application of current developments in econometric methodology to empirical problems in economics. Emphasis on the conduct of empirical research, including model and hypothesis formulation, testing, and integration of economic and econometric theory. 3 units. *Geweke, Marshall, McElroy, Tauchen, and Wallace*

249. Microeconomics. Cost and supply considerations in price theory; the demand for factors of production. The allocation of resources in the context of competitive and monopolistic market structures. (Not open to students who have taken Economics 149.) Prerequisites: Economics 2 or 52 and Mathematics 31. 3 units. *Staff*

250S. Modern Economic Thought. Integrated survey of the several major streams of economic theory since 1936. Selected topics from the economics of Keynes, its offshoots and coordinate developments, and post-Marxian economic theory. Historical evolution of recent ideas and their interrelations. Prerequisite: Economics 138 and 149 and 154 or consent of instructor. 3 units. *de Marchi or Weintraub*

254. Macroeconomics. Concepts and measurement of national income and expenditures, employment interest rates, and price levels; the theoretical determination of these aggregates, applications of macroeconomic growth. (Not open to students who have taken Economics 154.) 3 units. *Staff*

265S. International Trade and Finance. Fundamental principles of international economic relations. The economic basis for international specialization and trade and the economic gains from trade, the balance of international payments, problems of international finance, investments, and monetary problems. Prerequisites: Economics 149 and 154. 3 units. *Brock, Kimbrough, Krueger, or Tower*

268. Federal Tax Policy. Does not count for economics major requirements. See C-L: Public Policy Studies 268. 3 units. *Clotfelter or Schmalbeck*

270S. Fundamentals of Political Economy. See C-L: Political Science 270S. 3 units. *Aldrich, Bates, or Bianco*

286S. Economic Policy Making in Developing Countries. Does not count for economics major requirements. See C-L: Public Policy Studies 286S. 3 units. *Gillis*

287. Public Finance. Economic aspects of such problems as the growth of government, the proper role of the state, the centralization and decentralization of government, government bureaucracy, the impact of taxes and spending on the wealthy and the poor, other public policies and questions. Prerequisite: Economics 149. 3 units. *Davies*

293. Soviet Economic History. Establishment of foundations of a socialist economy: collectivization, industrialization, and search for economic efficiency. 3 units. *Trembl*

294S. Soviet Economic System. Economic planning and administration in the Soviet Union and other socialist countries. International comparisons. Theoretical and applied problems of resource allocation, economic development, and optimal micro decision-making in a nonmarket economy. 3 units. *Trembl*

For Graduates

301. Microeconomic Analysis I. Review of contemporary theory relating to production, the firm, and income distribution in competitive and imperfectly competitive markets. 3 units. *Graham*

302. Microeconomic Analysis II. A continuation of Economics 301 with emphasis on analyses of consumer behavior, general equilibrium, welfare economics, and capital theory. Prerequisite: Economics 301. 3 units. *Stahl*

304, 305. Monetary Theory and Policy. 304: theories of the supply of and demand for money (neoclassical and Keynesian macroeconomic), general equilibrium theories, and theories of the term structure of interest rates. 305: the theory and practice of monetary policy with emphasis on recent issues, the monetarist-fiscalist controversy, the monetary policy transmission mechanism, and policy simulations with econometric models. 3 units each. *Havrilesky, Kimbrough, or Yohe*

307. Quantitative Analysis I. A systematic analysis of the principal quantitative methods used in microeconomic theory. Neoclassical theories of production and distribution are used as vehicles for presenting the material. Considerable emphasis is placed on the application of mathematical analysis to economic models. 3 units. *Weintraub*

308. Quantitative Analysis II. Dynamic optimization techniques, including the calculus of variations and optimal control, are analyzed and applied to problems involving capital accumulation, resource extraction, and aspects of firm behavior. 3 units. *Graham, Henderson, or Stahl*

309. Trade and Development Theory. Theory of international trade and trade policy as it affects the structure and growth of individual economies, with emphasis on developing countries. Comparative advantage, factor proportions explanation of trade, infant industry and other arguments for protection, interactions of exchange rate and trade policy and special issues relating to primary commodities are examined. 3 units. *Krueger*

311, 312. History of Political Economy. A detailed review of the development of economic theory, the tools of economic analysis, and economics as a science, together with an analysis of the circumstances affecting this development. Period covered: pre-Christian times through 1936. 3 units each. *Goodwin*

313, 314. Seminar in Economic Theory. Prerequisite: Economics 301 or equivalent. 3 units each. *Weintraub*

317. Seminar in Demographic, Population, and Resource Problems (Development Economics I). Historical, empirical, and theoretical topics in development economics

focusing on real aspects of growth in a closed economy. Special attention to human resource economics (demography, education, nutrition), models of dualism, agricultural growth, and technology. 3 units. *Brock or Kelley*

319. Seminar in the Theory and the Problems of Economic Growth and Change (Development Economics II). Links between aid, financial markets, and real investment in an open economy stressing tariff protection and capital controls (internal and external). Economic policy making using market solutions and/or planning models (input-output, linear programming, and computable general equilibrium). 3 units. *Brock*

320. Macroeconomic Analysis I. Measurement of national income and other important aggregates; classical macroeconomics; Keynesian and more recent views of the determinants of income, employment, and price levels; empirical studies of consumption, investment, and monetary variables. 3 units. *Geweke or Kimbrough*

322. Macroeconomic Analysis II. Further analysis of topics treated in Economics 320. Optimal economic growth; business cycles. Issues in economic policy. Prerequisite: Economics 320. 3 units. *Geweke or Tauchen*

324, 325. Economics of the Law. An introduction to the methods of economic analysis with applications to legal issues. An elementary exposition of the mathematics of constrained optimization is included. Prerequisite for Economics 325: 324. 3 units each. *Graham*

326. Stochastic Macroeconomics. Advanced topics in macroeconomics with an emphasis on empirical macroeconomics and the interrelationship between economic theory and empirical work in macroeconomics. Topics include the interpretation of macroeconomic time series, formulating and testing models of asset pricing and market efficiency, solution and estimation of rational expectations models, vector autoregression models, and policy evaluation with empirical macroeconomic models. 3 units. *Tauchen*

329. Federal Finance. An analysis of the trends and hypotheses concerning the growth in governmental activity, the optimum level and composition of governmental spending, and the microeconomic and macroeconomic effects of governmental spending and tax policies. 3 units. *Clotfelter or Davies*

330. Seminar in Public Finance. 3 units. *Staff*

350. Modern Economic Thought. Principles of microeconomics in the analysis of problems and policies. The particular contextual materials that will be subjected to analysis will vary. Materials will be treated in the tradition of positive economics. 3 or 6 units. *Staff*

355. Seminar in Labor Economics. 3 units. *McElroy or Zarkin*

358. Seminar in Labor Market and Related Analysis. 3 units. *McElroy or Zarkin*

359. Economic Analysis of Legal Issues. An exploration of diverse topics in law and economics such as property rights and externalities, tort law and optimal accident prevention, bargaining and game theory, the economics of contracts, and theories of economic justice. 3 units. *Culp*

365. Seminar in International Trade Theory and Policy. 3 units. *Tower*

366. Seminar in International Monetary Theory. 3 units. *Kimbrough*

380. Graduate Economics Workshops. For postpreliminary students. May be taken for multiple credit. Sections: 01. Industrial Organization and Regulation; 02. International Economics; 03. Labor Economics; 04. Macroeconomics; 05. Public Finance; 06. Economic Thought; 07. Corporate Economics; 08. Applied Econometrics. 3 units each. *Staff*

388. Industrial Organization. The theory, measurement, and history of the firm-structure of industry. Emphasis upon the structure of American industry and upon actual production and pricing practices. Criteria for evaluating industrial performance. 3 units. *Grabowski, Meurer, or Vernon*

389. Seminar in Industrial and Governmental Problems. 3 units. *Grabowski or Vernon*

397, 398. Directed Research. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

234. Urban and Regional Economics

235. The Economics of Crime, Law Enforcement, and Justice

285. Evaluation of Public Expenditures

303. Theory of Economic Decision Making

316. Seminar in Economics of Soviet-Type Socialism

321. Theory of Quantitative Economic Policy

323. Income Distribution Theory

331. Seminar in Economic History

345, 346. Demographic Techniques I and II

401. Seminar on the British Commonwealth

402. Interdisciplinary Seminar in the History of the Social Sciences

RELATED COURSES IN OTHER DEPARTMENTS

Courses in related fields may be selected from anthropology, computer science, forestry, history, mathematics, philosophy, political science, public policy sciences, and sociology, or from an area that complements the candidate's area of research interests in economics.

See the Center for Demographic Studies in the chapter "Special and Cooperative Programs" for further information.

Education

Associate Professor Davis, *Chairman and Director of Graduate Studies* (213 West Duke); Professor Page; Associate Professors Ballantyne, Carbone, Di Bona, Johnson, and Sawyer; Professor Emeritus Gehman; Adjunct Associate Professors Martin and Pittillo; Lecturer Fowler

For students admitted to graduate programs prior to fall 1981, specific requirements may be obtained in the Graduate School office. Qualified juniors, seniors, and graduate students may enroll in appropriate education courses as electives.

For Seniors and Graduates

205, 206. Selected Topics. Three units each. *Staff*

215S. Seminar in Secondary School Teaching. Principles, practices, and problems in secondary school instruction. 3 units. *Carbone or staff*

216. Secondary Education: Internship. Supervised internship in senior high schools, involving some full-time teaching. Prerequisites: C average overall and in teaching field or fields; for student teachers only. 6 units. *Carbone or staff*

225. The Teaching of History and the Social Studies. Evaluation of the objectives, content, materials, and methods in the teaching of history and the social studies. 3 units. *Carbone or staff*

232. Learning and Living in Families. Role and function of the family as related to the development and behavior of its members, to gender identification, to parenting, and to interactions among family members. 3 units. *Ballantyne or Davis*

236. Teaching Developmental and Remedial Reading in the Secondary School. Principles, methods, and materials for the development of effective reading attitudes and skills in developmental and remedial programs. 3 units. *Staff*

242S. Group Interactions. Examination of theoretical issues and processes involved in the dynamics of, and learning in, small groups of children, adolescents, parents, other adults, with attention to problem-oriented groups. 3 units. *Ballantyne*

246. Teaching of Mathematics. Aims, curriculum, and classroom procedure for teaching secondary school mathematics. 3 units. *Staff*

276. Teaching of High School Science. Discussion, lectures, and collateral reading related to such topics as aims, tests, curriculum, classroom and laboratory procedure, field trips, and course and lesson planning for secondary school science. 3 units. *Staff*

For Graduates

350, 351. Directed Activities in Education. Internship experiences at an advanced level under supervision of appropriate staff. Prerequisite: consent of instructor. 3 units each. *Staff*

357. Directed Research. For students who have passed the preliminary examination. 1 to 6 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

211. Education and the Mass Media

212S. Pedagogy and Political Economy: A World View

227. Contemporary Theories of Counseling and Psychotherapy

248. Practicum in Counseling

Engineering

Earl H. Dowell, Sc.D., *Dean* (305 Teer Engineering Library Building)

Jack B. Chaddock, Sc.D., *Associate Dean for Research* (305 Teer Engineering Library Building)

The School of Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees with a major in biochemical, biomedical, civil and environmental, electrical, and mechanical engineering and materials science. These programs are designed to provide: (1) development of depth and breadth in mathematics, computer science, the basic physical sciences, the life sciences where appropriate, and the engineering sciences; (2) mastery of an advanced body of knowledge in the candidate's chosen field of specialization or research; (3) experience in the art of engineering, including strong elements of intuition, imagination, and judgement; and (4) performance of original research which, in the case of the M.S. degree, demonstrates the ability to advance knowledge in the area of professional study and, in the case of the Ph.D. degree, makes a significant contribution to the research literature through publication in a leading professional journal in the field. Engineering graduate students are expected to participate in seminars appropriate to their fields of study. A minimum of 30 units of earned graduate

credit beyond the bachelor's degree is required for the M.S. degree: 12 in the major, 6 in related minor work (usually mathematics or natural science), 6 in either the major or minor subject or in other areas approved by the major department, and 6 for a research-based thesis. A nonthesis option requiring 30 units of course credit is available. Each of the departments imposes additional requirements in the exercise of this option. There is no language requirement for this degree. A minimum of 60 units of earned graduate credit beyond the bachelor's degree is required for the Ph.D. degree. In civil and environmental engineering, 12 units of course work beyond the master's degree are required to be in the major field, 6 in a related minor field, and 6 in either the major or minor field; in electrical engineering, 24 units are required in the major field and 12 units in a related minor field (often mathematics or natural science), 12 in either the major or minor subject or other areas approved by the major department, and 12 for a research-based dissertation. In biomedical and mechanical engineering and materials science there are no specific course requirements; each program is planned to meet individual needs. Doctoral students are required to pass qualifying and preliminary examinations which may be either written, oral, or a combination of written and oral components, at the discretion of the committee and the department.

The Center for Biochemical Engineering offers both M.S. and Ph.D. degrees in biochemical engineering. Further details about this program may be found in the chapter "Special and Cooperative Programs" in this bulletin or obtained from the Director of Graduate Studies, Center for Biochemical Engineering.

In addition, the School of Engineering and the Fuqua School of Business offer an MBA/MS Joint-Degree Program. Further details about this program may be obtained from: Professor Eric Pas, Director, MBA/MS Joint-Degree Program, Department of Civil and Environmental Engineering.

BIOMEDICAL ENGINEERING

Professor McElhaney, *Chairman* (136 Engineering); Professor Plonsey, *Director of Graduate Studies* (276 Engineering Annex); Professors Barr, Clark, Hammond, Hochmuth, Nolte, Pilkington, Thurstone, von Ramm, and Wolbarsht; Associate Professors Burdick, Jaszczak, and Riederer; Assistant Professors Daniels, Nandedkar, Reichert, Smith, Trahey, and Truskey

Biomedical Engineering is the discipline in which the physical, mathematical, and engineering sciences and associated technology are applied to biology and medicine. Contributions range from modeling and simulation of physiological systems through experimental research to solutions of practical clinical problems. The goal of the graduate program in biomedical engineering is to combine training in advanced engineering, biomedical engineering, and the life sciences so that graduates of the program can contribute at the most advanced professional level. The doctoral dissertation should demonstrate significant and original contributions to an interdisciplinary topic, accomplished as an independent investigator. The major, current, research areas are: biochemical engineering, biofluid mechanics, biomechanics, biomedical materials, biomedical modeling, biosensors, biotechnology, data acquisition and processing, medical imaging, and electrophysiology. Every biomedical engineering graduate student is required to serve as a teaching assistant as part of the graduate training.

201. Electrophysiology. The electrophysiology of excitable cells from a quantitative perspective. Topics include the ionic basis of action potentials, the Hodgkin-Huxley model, impulse propagation, source-field relationships, and an introduction to functional electrical stimulation. Student chooses a relevant topic area for detailed study and report. Not open to students who have taken Biomedical Engineering 101 or equivalent. 3 units. *Barr or Plonsey*

202. Biomedical Transfer Processes. An introduction to biomedical diffusion and momentum transfer with particular emphasis on physical models of biological and artificial organ systems. 3 units. *Clark and Hochmuth*

205, 206. Microprocessors and Digital Instruments. Design of microcomputer-based devices including both hardware and software considerations of system design. Primary emphasis on hardware aspects, including a progression through initial design, prototype construction in the laboratory, testing of prototypes to locate and correct faults, and final design evaluation. Evaluation includes examination of complexity, reliability, and cost. Design and construction oriented toward biomedical devices or instruments that include dedicated microcomputers, usually operating in real time. Prerequisites for 205: Engineering 51 and Biomedical Engineering 163, 164 or equivalents; for 206: satisfactory work in 205. 4 units each. *Barr, Hammond, and von Ramm*

207. Transport Phenomena in Biological Systems. An introduction to the modeling of complex biological systems using principles of advanced transport and kinetic process analyses. A continuum approach will be used to analyze multicomponent mass transport and reactions in systems found in biotechnological and biomedical applications. Systems considered will include facilitated versus active transport of nutrients across membranes, lung oxygen transport models, artificial kidney design (external membrane dialysis and peritoneal dialysis), electrophoresis, pulsatile flow in arterial systems, attached enzyme reactions, and microbial adhesion to solid surfaces. C-L: Civil Engineering 207 and Mechanical Engineering 207. One course. *Bryers, Daniels, or Hochmuth*

211. Theoretical Electrophysiology. Mathematical analysis of intracellular and extracellular currents and voltages arising from subthreshold and transthreshold stimuli applied to excitable tissue (cardiac and striated muscle and nerve). Bases for and behavior of models of excitable tissue utilizing discrete and continuous formulations. Evaluation of sources of extracellular fields. Description of, and evaluation of, models of membrane behavior. Laboratory exercises based on computer simulation, with emphasis on quantitative behavior and design. Readings from original literature. Prerequisite: Biomedical Engineering 101 or 201. 4 units. *Barr and Plonsey*

212. Theoretical Electrocardiography. Mathematical analysis of currents flowing between the heart and body surface. Cardiac electrophysiology. Consideration of cardiac models, inhomogeneities, and surface lead systems. Examination of lead systems, and the interpretation of body surface measurements using inverse calculations. Laboratory exercises based on computer simulation with emphasis on quantitative behavior and design. Readings from the original literature. Prerequisite: Biomedical Engineering 101 or 201. 4 units. *Barr and Plonsey*

215. Biomedical Materials and Artificial Organs. Chemical structures, processing methods, evaluation procedures, and regulations for materials used in biomedical applications. Applications will include implant materials, components of *ex vivo* circuits, and cosmetic prostheses. Primary emphasis will be placed on polymer-based materials and on optimization of parameters of materials which determine their utility in applications such as artificial kidney membranes and artificial arteries. Prerequisite: Engineering 83 or Chemistry 151 or consent of instructor. C-L: Mechanical Engineering 215. 3 units. *Clark*

222. Principles of Ultrasound Imaging. Propagation, reflection, refraction, and diffraction of acoustic waves in biologic media. Topics include geometric optics, physical optics, attenuation, and image quality parameters such as signal-to-noise ratio, dynamic range, and resolution. Emphasis is placed on the design and analysis of medical ultrasound imaging systems. Prerequisites: Physics 52 and Mathematics 111. 3 units. *von Ramm*

230. Biomechanics. Basic elements of mechanics are developed with application in biomechanics. Primary emphasis is given to trauma mechanisms, injury criteria, and human protection. Head and neck injuries and helmet design are discussed. Case studies from product liability lawsuits with a strong biomechanics context are discussed in a seminar mode. 3 units. *McElhaney*

233. Modern Diagnostic Imaging Systems. The underlying concepts and instrumentation of several modern medical imaging modalities. Review of applicable linear systems theory and relevant principles of physics. Modalities studied include X-ray radiography (conventional film-screen imaging and modern electronic imaging), computerized tomography (including the theory of reconstruction), and nuclear magnetic resonance imaging. Prerequisite: consent of instructor. 3 units. *Riederer*

235. Acoustics and Hearing. This course covers the generation and propagation of acoustic (vibrational) waves and their reception and interpretation by the auditory system. Topics under the heading of generation and propagation include free and forced vibrations of discrete and continuous systems, resonance and damping, and the wave equation and solutions. To understand the reception and interpretation of sound, the anatomy and physiology of the mammalian auditory system are presented, and the mechanics of the middle and inner ears studied. Prerequisites: Physics 52 and Mathematics 111 or equivalents. 3 units. *Trahey*

243. Computers in Biomedical Engineering. An in-depth study of the use of computers in biomedical applications. Hardware, software, and applications programming. Data collection, analysis, and presentation studied within application areas such as monitoring, medical records, computer-aided diagnoses, computer-aided instruction, M.D.-assistance programs, laboratory processing, wave form analysis, hospital information systems, and medical information systems. 3 units. *Hammond*

265. Advanced Topics in Biomedical Engineering. Advanced subjects related to programs within biomedical engineering tailored to fit the requirements of a small group. Prerequisites: consent of instructor. 1 to 4 units. *Staff*

For Graduates

333. Biomedical Imaging. A study of the fundamentals of information detection, processing, and presentation associated with imaging in biology and medicine. Analysis of coherent and incoherent radiation and various image generation techniques. Also covered will be the psychometrics of image evaluation dealing with subjective and objective parameters. Emphasis will be placed upon sonography, thermography, X-ray, various forms of nuclear radiography, microscopy, and holography. 3 units. *Thurstone*

399. Special Readings in Biomedical Engineering. Individual readings in advanced study and research areas of biomedical engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 3 units each. *Staff*

COURSES CURRENTLY UNSCHEDULED

204. Measurement and Control of Cardiac Electrical Events

221. Electrophysiological Techniques

311. Inverse Models

CIVIL AND ENVIRONMENTAL ENGINEERING

Professor Vesilind, *Chairman* (121 Engineering); Professor Utku, *Director of Graduate Studies* (122 Engineering); Professors Melosh, Petroski, Vesilind, and J. F. Wilson; Associate Professors Biswas, Bryers, Hueckel, Medina, Pas, Peirce, and Reckhow; Assistant Professors Faust and Marin; Adjunct Professor Kranich

A student may specialize in one of the following fields of study for either the M.S. or the Ph.D. degree: environmental engineering; geotechnical engineering and soil mechanics; mechanics of solids; materials engineering; fluid mechanics, water resources, and ocean engineering; structural engineering; and urban systems and transportation. Interdisciplinary programs combining study in some of the major areas with biological, chemical, and physical sciences, business administration, materials science, social sciences, political science, public policy studies, and other areas of engineering are also available.

Students at the M.S. level are expected to complete a thesis. However, with the approval of the department, a master's degree candidate in civil engineering may choose, in lieu of submitting a thesis, to complete an additional 6 units of course work plus a special project. If this alternative is elected, candidates are expected to take comprehensive examinations over their graduate course work, and also to defend orally their special projects.

Under the Reciprocal Agreement with Neighboring Universities, a student may include as a portion of the minimum requirements work offered by the Department of Environmental Sciences and Engineering of the University of North Carolina. Although related work normally is taken in the natural sciences or mathematics, a student whose major interest relates to the social or managerial sciences may take relevant work in these areas.

201. Advanced Mechanics of Solids. Tensor fields and index notation. Analysis of states of stress and strain. Conservation laws and field equations. Constitutive equations for elastic, viscoelastic, and elastic-plastic solids. Formulation and solution of simple problems in elasticity, viscoelasticity, and plasticity. 3 units. *Hueckel or Petroski*

203. Plasticity. Inelastic behavior of soils and engineering materials; yield criteria; flow rules; concepts of perfect plasticity and plastic hardening; methods of rigid-plasticity; limit analysis; isotropic and kinematic hardening; plastic softening; diffused damage; thermo-plasticity; and visco-plasticity. Prerequisite: Civil and Environmental Engineering 201 or consent of instructor. 3 units. *Hueckel*

204. Plates and Shells. Differential equation and extremum formulations of linear equilibrium problems of Kirchhoffian and non-Kirchhoffian plates of isotropic and orthotropic material. Solution methods. Differential equation formulation of thin shell problems in curvilinear coordinates; membrane and bending theories; specialization for shallow shells, shells of revolution, and plates. Extremum formulation of shell problems. Solution methods. Prerequisites: Mathematics 111 and Engineering 75 or 135. 3 units. *Utku*

205. Elasticity. Introduction to linear theory of elasticity. Constitutive equations for anisotropic and isotropic elastic solids. Formulation and solution of torsion, bending, and flexure problems. Plane, axisymmetric, and three-dimensional problems. 3 units. *Petroski*

207. Transport Phenomena in Biological Systems. See C-L: Biomedical Engineering 207; also C-L: Mechanical Engineering 207. 3 units. *Bryers, Daniels, or Hochmuth*

210. Intermediate Dynamics. See C-L: Mechanical Engineering and Materials Science 210. 3 units. *Dowell*

212. Mechanical Behavior and Fracture of Materials. Historical perspective on structural failure. Fracture mechanics and its application to brittle and ductile fracture; fatigue in structural materials. Analysis of load spectra; fatigue crack growth calculations. 3 units. *Petroski*

215. Engineering Systems Analysis. Fundamental concepts and tools for engineering systems analysis, including optimization techniques and decision analysis. System

definition and model formulation, optimization by calculus, linear programming, integer programming, separable integer programming, nonlinear programming, network analysis, dynamic programming, and decision analysis. Application to diverse engineering systems. 3 units. *Pas*

216. Transportation Planning and Policy Analysis. Issues in policy planning and decision making in urban and rural transportation systems. Transportation legislation. Public transportation alternatives with emphasis on public transit and paratransit solutions. Corequisite: Civil and Environmental Engineering 116 or consent of instructor. C-L: Public Policy Studies 254. 3 units. *Pas*

217. Transportation Systems Analysis. The transportation systems planning process. Quantitative analysis; mathematical modeling and computer simulation techniques for short- and long-range planning and evaluation of transportation systems. Corequisite: Civil and Environmental Engineering 116. 3 units. *Pas*

218. Engineering Management and Project Evaluation. Statistical analysis and economics. Data organization, distributions, estimates of parameters, hypothesis testing, analysis of variance. Economic impact assessment, supply and demand forecasting, benefit/cost analysis, economic incentives, public and private finance, input/output analysis. 3 units. *Peirce*

225. Dynamic Engineering Hydrology. Dynamics of the occurrence, circulation, and distribution of water; hydrometeorology; geophysical fluid motions. Precipitation, surface runoff and stream-flow, infiltration, water losses. Hydrograph analysis, catchment characteristics, hydrologic instrumentation, and computer simulation models. Prerequisite: Civil and Environmental Engineering 122 or consent of instructor. 3 units. *Medina*

227. Groundwater Hydrology and Contaminant Transport. Review of surface hydrology and its interaction with groundwater. The nature of porous media, hydraulic conductivity, and permeability. General hydrodynamic equations of flow in isotropic and anisotropic media. Water quality standards and contaminant transport processes: advective-dispersive equation for solute transport in saturated porous media. Analytical and numerical methods, selected computer applications. Deterministic versus stochastic models. Applications: leachate from sanitary landfills, industrial lagoons and ponds, subsurface wastewater injection, monitoring of groundwater contamination. Conjunctive surface-subsurface models. Prerequisites: Civil and Environmental Engineering 122 and 123 or consent of instructor. 3 units. *Medina*

233. Prestressed Concrete Design. A critical review of research and recent developments in prestressed concrete design. Prestressed tanks, beams, and columns; partial prestressing and composite design. Prerequisite: Civil and Environmental Engineering 133. 3 units. *Biswas*

235. Foundation Engineering. An introduction to methods of analysis, design, and construction of foundations. Bearing capacity and settlement of shallow and deep foundations. Soil exploration, excavation and bracing, drainage and stabilization, and underpinning. Foundation vibrations. 3 units. *Hueckel*

236. Earth Structures. An introduction to methods of analysis, design, and construction of earth structures such as dams, embankments, cuts, canals, and airfield and highway pavements. Selection of materials, soil compaction, and stabilization. Theory of seepage, design of wells and drainage collectors. Slope stability and related problems. Theory of layered systems and pavement design procedures. 3 units. *Hueckel*

237. Advanced Soil Mechanics. Characterization of behavior of geomaterials; stress-strain incremental laws; nonlinear elasticity, hypo-elasticity, plasticity, and visco-elasticity of geomaterials; approximated laws of soil mechanics; fluid saturated soil behavior; cyclic

behavior of soils, liquefaction and cyclic mobility; elements of soil dynamics; and thermal effects on soils. Prerequisite: Civil and Environmental Engineering 139 or equivalent. 3 units. *Hueckel*

241. Aquatic Chemistry. Chemical processes in the natural water environment. Quantitative treatment of the variables which determine the composition of natural waters. Emphasis on chemical behavior of natural aquatic systems including lakes, ocean waters, rivers, estuaries, groundwaters, and water treatment systems. 3 units. *Bryers*

243. Physicochemical Unit Operations in Water Treatment. Fundamental bases for design of water and waste treatment systems, including transport, mixing, sedimentation and filtration, gas transfer, coagulation, and biotreatment processes. Prerequisite: Engineering 24 or Civil and Environmental Engineering 124. 3 units. *Bryers or Vesilind*

244. Applied Microbial Processes. Existing and novel biological processes used to treat or exploit waste. Concepts of microbiology, chemical engineering, and process analysis. Specific biological processes such as aerobic carbon oxidation, nitrification, denitrification, methane production, biological electricity generation, aerobic digestion, and wastewater treatment for long-term space travel. 3 units. *Bryers*

245. Pollutant Transport Systems. Distribution of pollutants in natural waters and the atmosphere, diffusive and advective transport phenomena within the natural environment and through artificial conduits and storage/treatment systems. Analytical and numerical prediction methods. Prerequisites: Civil and Environmental Engineering 122 and Mathematics 111 or equivalents. 3 units. *Medina*

246. Water Supply Design. The study of water resources and municipal water requirements including reservoirs, transmission, treatment and distribution systems; methods of collection, treatment, and disposal of municipal and industrial wastewaters. The course includes the preparation of a comprehensive engineering report encompassing all aspects of municipal water and wastewater systems. Field trips to be arranged. Prerequisite: Civil and Environmental Engineering 124 or consent of instructor. 3 units. *Vesilind*

248. Solid Waste and Resource Recovery Engineering. Engineering design of resource recovery systems including traditional and advanced technologies. Sanitary landfills and incineration of solid wastes. Energy recovery and recycling municipal refuse. Collection, treatment, and disposal of solid wastes from wastewater treatment. Prerequisite: Civil and Environmental Engineering 124 or consent of instructor. 3 units. *Vesilind*

249. Control of Hazardous and Toxic Waste. Solutions to industrial and municipal hazardous waste management problems. Handling, transportation, processing, storage, and disposal technologies. Upgrading an abandoned disposal site. Economic and regulatory aspects. Case studies. Prerequisite: consent of instructor. 3 units. *Peirce*

251. Systematic Engineering Analysis. Mathematical formulation and numerical analysis of discrete engineering systems with emphasis on theory of structures. Equilibrium and propagation problems in continuum; properties of these systems and their discretization by the trial functions with undetermined parameters. The use of weighted residual methods, finite elements, and finite differences. Prerequisite: senior or graduate standing. 3 units. *Utku*

254. Applications of Finite Element Analysis. Theory of element and material models; models of metals, rock, reinforced concrete, wood, glass, soil, water, and air; analyses of torsion members, shear walls, membranes, plates, shells, solids, and compound structural systems; analysis of soil-structure and fluid-structure systems; prediction of field heating, seepage, and pollution. Prerequisite: Civil and Environmental Engineering 251 or consent of instructor. 3 units. *Melosh*

257. Structural Optimization. Computer-aided improvement of structural designs; redesign search processes, sensitivity analysis, integrity analysis; optimization of static, steady-state, and transient response systems; minimization of structural weight and response potentials for trusses, frames, and continua. 3 units. *Melosh*

258. Analysis of Dynamic and Nonlinear Behavior of Structures. Computation of nonlinear response by discretization; models for simulation of geometric, material, and boundary constraint nonlinearities; analysis of limit loads, bifurcations, and snap-through; simulation of super-elastic, plastic, viscoelastic, and slipping materials; prediction of collapsing, ballooning, gapping, metal forming, and welding behavior. Prerequisite: Civil and Environmental Engineering 251 or consent of instructor. 3 units. *Melosh*

265. Advanced Topics in Civil and Environmental Engineering. Opportunity for study of advanced subjects relating to programs within the civil and environmental engineering department tailored to fit the requirements of a small group. 1 to 3 units. *Graduate staff*

281. Experimental Systems. Formulation of experiments; Pi theorem and principles of similitude; data acquisition systems; static and dynamic measurement of displacement, force, and strain; interfacing experiments with digital computers for statistical data analysis; students select, design, perform, and interpret laboratory-scale experiments in areas of fluid systems including environmental and ocean engineering, and in solid systems including structural and basic material behavior. 3 units. *J. F. Wilson*

283. Structural Dynamics. Formulation of dynamic models for discrete and continuous structures, normal mode analysis, deterministic and stochastic responses to shocks and environmental loading (earthquakes, winds, and waves), introduction to nonlinear dynamic systems, analysis and stability of structural components (beams and cables and large systems such as offshore towers, moored ships, and floating platforms). 3 units. *J. F. Wilson*

301, 302. Fall and Spring Seminars. Current topics in civil and environmental engineering theory and practice. No credit. *Director of Graduate Studies*

399. Special Readings in Civil and Environmental Engineering. Special individual readings in a specific area of study in civil and environmental engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 3 units. *Graduate staff*

COURSES CURRENTLY UNSCHEDULED

202. Advanced Mechanics of Solids II

221. Incompressible Fluid Flow

222. Open Channel Flow

223. Flow Through Porous Media

226. Operational Hydrology

231. Structural Engineering Analysis

232. Reinforced Concrete Design

234. Advanced Structural Design in Metals

238. Rock Mechanics

239. Physical Properties of Soils

247. Air Pollution Control

337. Elements of Soil Dynamics

350. Advanced Engineering Analysis

ELECTRICAL ENGINEERING

Professor Casey, *Chairman* (130 Engineering); Professor Marinos, *Director of Graduate Studies* (173 Engineering); Professors Fair, Joines, Kerr, Nolte, Pilkington, Trivedi, Wang, and T. G. Wilson; Associate Professors Hacker, Kedem, and Massoud; Assistant Professors Alexandrou, Board, Dollas, Dugan, George, and Wong; Research Assistant Professor Frenzel; Professor Emeritus Owen

A student may specialize in any one of the following fields in working toward either the M.S. or the Ph.D. degree with a major in electrical engineering: computer-aided design, computer engineering, detection and estimation theory, digital signal processing, electromagnetic fields and microwaves, integrated circuit design and fabrication, microprocessor systems, robotics and control systems, solid-state devices and materials, solid-state power conditioning, and VLSI circuit design.

Recommended prerequisites for the graduate courses in electrical engineering include a knowledge of basic mathematics and physics, electric networks, and system theory. Students in doubt about their background for enrollment in specific courses should discuss the matter with the Director of Graduate Studies. The M.S. degree program includes either a thesis or a project and an oral examination. A qualifying examination is required for the Ph.D. degree program. This examination is intended to test both the breadth and depth of the student's understanding of basic electrical engineering concepts. There is no foreign language requirement.

202. Digital Communication Systems. Transmission of pulse signals over analog channels at baseband and high frequency. Effects of channel amplitude and phase distortion, multipath, and noise. Typical signaling formats and their autocorrelation functions and power spectra. Theory and design of adaptive transversal filters for the elimination of intersymbol interference. Design of digital transversal matched filters to reduce error probabilities in the presence of noise. Optimum pulse shaping techniques and Nyquist channel characteristics. Discrete Fourier transforms, FFT's, and their relation to continuous Fourier transforms. Introduction to the channel characteristics and sources of noise in optical fiber channels. Prerequisites: Electrical Engineering 186, and Mathematics 135 or Electrical Engineering 203, or permission of instructor. 3 units. *Kerr*

203. Random Signals and Noise. Introduction to mathematical methods of describing and analyzing random signals and noise. Review of basic probability theory; joint, conditional, and marginal distributions; random processes. Time and ensemble averages, correlation, and power spectra. Optimum linear smoothing and predicting filters. Introduction to optimum signal detection and parameter estimation. 3 units. *Kerr or Nolte*

204. Computer Network Architecture. The architecture of computer communication networks and the hardware and software required to implement the protocols that define the architecture. Basic communication theory, transmission technology, private and common carrier facilities. International standards. Satellite communications and local area networks. Performance analysis and modeling of communication networks. Prerequisite: Electrical Engineering 157. C-L: Computer Science 204. 3 units. *Strole*

205. Signal Detection and Extraction Theory. Introduction to signal detection and information extraction theory from a statistical decision theory viewpoint. Subject areas covered within the context of a digital environment are decision theory, detection and estimation of known and random signals in noise, estimation of parameters and adaptive recursive digital filtering, and decision processes with finite memory. Applications to problems in communication theory. Prerequisite: Electrical Engineering 203 or consent of instructor. 3 units. *Nolte*

206. Digital Signal Processing. Introduction to the fundamentals of processing signals by digital techniques with applications to practical problems. Discrete time signals

and systems, elements of the Z-transform, discrete Fourier transforms, digital filter design techniques, fast Fourier transforms, and discrete random signals. 3 units. *Nolte*

207. Fault-Tolerant and Testable Computer Systems. Faults and failure mechanisms, test generation techniques and diagnostic program development for detection and location of faults in digital networks; design for testability, redundancy techniques, self-checking and fail-safe networks, fault-tolerant computer architectures. Prerequisite: Electrical Engineering 157 or equivalent. C-L: Computer Science 207. Fall. 3 units. *Board or Marinos*

208. Digital Computer Design. Structural organization and hardware design of digital computer systems. Arithmetic unit, switching matrices, memory organization, central processing unit (CPU), I/O unit, and microprogram control. Detailed design and simulation of a general-purpose computer system. Computer systems based on cellular structures, hardware compilers, and parallel processing architectures are also discussed. Prerequisite: Electrical Engineering 157 or consent of instructor. C-L: Computer Science 208. Spring. 3 units. *Dollas or Marinos*

209. Microprocessor Fundamentals and Applications. Various state-of-the-art microprocessor chips and their associated instruction sets, microcomputer architectures, comparative study of various microprocessor designs, microprocessor-based system design illustrated by several carefully selected design projects. Prerequisites: Electrical Engineering 157 and consent of instructor. C-L: Computer Science 209. Fall. 4 units. *George*

210. Introduction to VLSI Systems. A study of devices, circuits, fabrication technology, logic design techniques, and system architecture intended to provide the student with an understanding of the underlying physics and design techniques of VLSI systems. Students are required to complete the design of a digital subsystem in NMOS. Prerequisites: Electrical Engineering 157 and 216 or consent of instructor. Spring. 3 units. *Dollas*

211. Quantum Mechanics. Wave mechanics and elementary applications, free particle motion, Schrödinger equation, approximation methods. Fall. 3 units. *Staff*

213. Modern Optics. Optical processes including the propagation of light, coherence, interference, and diffraction. Consideration of the optical properties of solids with applications of these concepts to lasers and modern optical devices. 3 units. *Guenther or Hacker*

214. Introduction to Solid-State Physics. Discussion of solid-state phenomena including crystalline structures, thermal properties, free electron theory of metals, and band theory of semiconductors with emphasis on understanding the electrical, magnetic, and optical properties of solids. Prerequisite: Physics 161 or equivalent. C-L: Physics 214. 3 units. *Hacker*

216. Devices for Integrated Circuits. Basic operating concepts of the devices that are used in integrated circuits: Schottky-barriers, ohmic contacts, p-n junctions, bipolar transistors, and Si MOS capacitors and field-effect transistors. Basic MOS logic circuits. Selected laboratory work. Fall. 3 units. *Casey*

218. Integrated Circuit Engineering. Basic processing techniques and layout technology for integrated circuits. Photolithography, diffusion, oxidation, ion implantation, and metallization. Design, fabrication, and testing of integrated circuits. Prerequisite: Electrical Engineering 216. 4 units. *Casey or Fair*

219. Digital Integrated Circuits. Analysis and design of digital integrated circuits. MOSFET and bipolar devices. SPICE models. Major logic families such as NMOS, CMOS, TTL, ECL, and I²L as well as regenerative logic circuits and memories. Circuit design considerations for LSI and VLSI. Prerequisites: Electrical Engineering 157 and 216. 3 units. *Massoud*

225. Microwave Electronic Circuits. Microwave circuit analysis and design techniques. Properties of planar transmission lines for integrated circuits. Matrix and computer-aided methods for analysis and design of circuit components. Analysis and design of input, output, and interstage networks for microwave transistor amplifiers and oscillators. Prerequisite: Electrical Engineering 161 or equivalent. 3 units. *Joines*

227. Network Synthesis. Linear network theory, including a review of time and frequency domain analysis; network graphs, network functions and realizability condition; driving point impedance synthesis of passive networks; driving point and transfer specifications; approximation methods. Prerequisite: consent of instructor. 3 units. *George*

234. Power Electronics: High-Power Circuits. Basic principles of analysis and design of electronic power control and conversion circuits with particular emphasis on thyristor (SCRs, TRIACs, etc.) circuits. Characteristics of high-power semiconductors, commutating circuits, AC voltage controllers, AC-to-AC controlled rectifiers, DC-to-DC converters, DC-to-AC inverters, AC-to-AC converters. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. 4 units. *T. G. Wilson*

235. Nonlinear Magnetic and Semiconductor Power Converters. Nonlinear magnetic and semiconductor switching characteristics for transient and steady-state analysis of power electronic circuits. Design of saturable and nonsaturating magnetic devices. State-plane analysis of negative-resistance oscillators and self-oscillating inverters. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. 4 units. *T. G. Wilson*

236. Energy-Storage Power Converters. Analysis and design of switch-mode electronic power converters utilizing energy-storage principles. Determination of large-signal and small-signal dynamic response and stability of closed-loop regulated converters. Extensive use of computer-aided analysis, design and measurement techniques. Laboratory. Prerequisite: Electrical Engineering 161 or equivalent. 4 units. *T. G. Wilson*

241. Linear Systems. Modeling of multiple input-output linear systems in the frequency and time domains. Matrix differential and difference equations and their solutions; state variables. Digital simulation of differential systems. Fourier analysis of signals and systems. Transform techniques applied to state variable models. State-space models of distributed systems. 3 units. *Kerr or Wang*

243. Advanced Linear Systems. Linear spaces and linear operators. Impulse-response matrices. Controllability and observability. Irreducible realizations of rational transfer-function matrices. Canonical forms, state estimators, and observer theory. Stability. Linear time-invariant composite systems. Prerequisite: Electrical Engineering 241. 3 units. *Wang*

250. Introduction to Robotics. Fundamental notions in robotics, basic configurations of manipulator arm designs, coordinate transformations, control of robot actions, robot programming, artificial intelligence; machine vision, force, touch, and other sensory systems; selected laboratory assignments. Prerequisites: Electrical Engineering 112 and consent of instructor. 3 units. *Wang*

251. Pattern Classification and Recognition. Parameter estimation and supervised learning; nonparametric techniques; linear discriminant functions; clustering; language theory related to pattern recognition; examples from areas such as character and severe weather recognition, classification of community health data, recognition of geometrical configurations, algorithms for recognizing low resolution touch-sensor array signatures and 3-D objects. Prerequisite: consent of instructor. 3 units. *Wang*

252. Computer Systems Organization. See C-L: Computer Science 252. 3 units. *Ellis*

265. Advanced Topics in Electrical Engineering. Opportunity for study of advanced subjects related to programs within the electrical engineering department tailored to fit the requirements of a small group. Prerequisites: approval of Director of Graduate Studies and instructor. 1 to 4 units. *Staff*

271. Electromagnetic Theory. The classical theory of Maxwell's equations; electrostatics, magnetostatics, boundary value problems including numerical solutions, currents and their interactions, and force and energy relations. Three class sessions. Prerequisite: consent of instructor. 3 units. *Hacker or Joines*

272. Electromagnetic Communication Systems. Review of fundamental laws of Maxwell, Gauss, Ampere, and Faraday. Elements of waveguide propagation and antenna radiation. Analysis of antenna arrays by images. Determination of gain, loss, and noise temperature parameters for terrestrial and satellite electromagnetic communication systems. Prerequisite: Electrical Engineering 164 or 271. 3 units. *Joines*

273. Optical Communication Systems. Mathematical methods, physical ideas, and device concepts of optoelectronics. Maxwell's equations, and definitions of energy density and power flow. Transmission and reflection of plane waves at interfaces. Optical resonators, waveguides, fibers, and detectors are also presented. Prerequisite: Electrical Engineering 143 or equivalent. 3 units. *Joines*

308. Advanced Topics in Digital Systems. A selection of advanced topics from the areas of digital computer architectures and fault-tolerant computer design. Prerequisite: Electrical Engineering 208 or equivalent. C-L: Computer Science 308. 3 units. *Marinos*

310. CMOS VLSI Design. A second course in VLSI, aimed at the design of VLSI systems in CMOS. The main thrusts of the course will be (1) to provide enough background in the theory of CMOS circuits to understand circuit level trade-offs; (2) to introduce a symbolic design system and its supporting software, which greatly aid the design process; (3) to examine sample chip designs with an eye to understanding competitive design methodologies. Students will complete a CMOS-oriented project comprising the design and implementation of either a hardware or a software subsystem. Prerequisite: Electrical Engineering 210 or equivalent. C-L: Computer Science 310. 3 units. *Kedem*

316. Advanced Physics of Semiconductor Devices. Semiconductor materials: band structure and carrier statistics. Advanced treatments of metal-semiconductor contacts, Schottky barriers, p-n junctions, bipolar transistors (charge-control and Gummel-Poon models), and field-effect transistors (short channel effects, scaling theory, subthreshold conduction, nonuniformly doped substrates, surface and buried-channel devices, hot-electron effects). Device modeling in two dimensions using PISCES. Prerequisite: Electrical Engineering 216. 3 units. *Massoud and Goodwin-Johansson*

320. Integrated Circuit Fabrication Laboratory. Introduction to IC fabrication processes. Device layout. Mask design and technology. Wafer cleaning, etching, thermal oxidation, thermal diffusion, lithography, and metallization. Laboratory fabrication and characterization of basic IC elements (p-n junctions, resistors, MOS capacitors, gated diodes, and MOSFETs). Use of four-point probe, ellipsometer, spreading resistance probe, scanning electron microscope, and evaporation system. Testing of basic inverters and gates. Prerequisite: Electrical Engineering 218. 3 units. *Massoud*

333. Electronic Properties of Submicron Solid-State Devices. Doping, disordering, and grading in heterojunctions and superlattices. MOCVD and MBE growth techniques. Physical properties of submicron electronic devices, high-speed transport, mobility, energy band structure, and scattering processes. Classical and quantum transport, quantum state transfer, controlled deformation of electron wave functions, mobility modulation, and phonon dynamics. Two-dimensional electron gases and plasmons. Monte Carlo simulation of submicron device performance. Current research and recent developments will be emphasized. Prerequisite: Quantum mechanics. C-L: Physics 333. 3 units. *Stroscio*

399. Special Readings in Electrical Engineering. Special individual readings in a specified area of study in electrical engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 4 units. *Graduate staff*

COURSES CURRENTLY UNSCHEDULED

- 215. Semiconductor Physics
- 217. Lasers
- 222. Nonlinear Analysis
- 224. Advanced Electronic Circuits
- 226. Modeling/Computer-Aided Analysis of Electronic Systems
- 302. Applied Information Theory and Statistical Estimation
- 305. Advanced Topics in Signal Processing
- 317. Quantum Electronics
- 324. Nonlinear Oscillations in Physical Systems
- 342. Optimal Control Theory
- 371. Advanced Electromagnetic Theory
- 373. Selected Topics in Field Theory

MECHANICAL ENGINEERING AND MATERIALS SCIENCE

Professor Hochmuth, *Chairman* (142A Engineering); Professor Harman, *Director of Graduate Studies* (145 Engineering); Professors Bejan, Chaddock, Cocks, Dowell, Garg, Gösele, Pearsall, Shaughnessy, Shepard, and Tan; Associate Professors Bliss, Jones, Quinlan, and Wright; Assistant Professors Buzzard, Cherry, Georgiadis, Knight, and Needham; Associate Professor Emeritus Elsevier; Adjunct Assistant Professor Lind; Research Assistant Professors Pezeshki and Tran-Son-Tay

The department offers programs of study and research leading to the M.S. and Ph.D. degrees in both mechanical engineering and materials science. Current research areas available include: transonic unsteady aerodynamics for aeroelastic applications using computational fluid dynamics, heat transfer in free convection and in porous media, biomechanics, hybrid Galerkin numerical studies, diffusion and convection in heterogeneous media, electrodynamics, thermal performance of buildings, power generation, thermal design by entropy minimization, solar energy utilization, computational Lagrangian fluid dynamics, turbulence and transport processes in biotechnology, nonlinear chaotic systems, vibrations and acoustics of dynamic structures, sound propagation in porous media and absorbing materials, nonlinear control systems, design and control of robotic and automated manufacturing systems, finite element techniques, expert systems, bearing design and lubrication, failure analysis and product design, positron annihilation spectroscopy, polymer science, point defects, line defects, diffusion and kinetics in Si, GaAs and other electronic materials, electron energy transfer in solids and liquids, high temperature superconductors, mechanical properties of human kidney stones and gallstones, systems and processes for *in vitro* growth of animal cells, and mathematical modeling and optimization of bioprocesses.

202. Engineering Thermodynamics. General thermodynamic relationships and continuum properties of real substances. Availability and second law analysis of energy conversion processes. Low temperatures and the third law of thermodynamics. Reaction and multiphase equilibrium. Statistical thermodynamics of simple systems. 3 units. *Bejan and Harman*

205. Biochemical Engineering. Mathematical analysis of the effects of substrate concentration, pH, temperature, and chemical inhibitors on the rate and yield of biological processes. Enzyme kinetics. Kinetics of cell growth and metabolite production in batch and continuous culture. Design of bioreactors for microbial, mammalian, and plant cell culture. Prerequisites: calculus and a course in microbial physiology or biochemistry. 3 units. *Quinlan*

206. Optimization of Bioprocess Kinetics. Concepts and mathematical modeling techniques needed to maximize the rates and yields at which cells produce biomass and metabolites. Prerequisite: Mechanical Engineering 205. 3 units. *Quinlan*

207. Transport Phenomena in Biological Systems. See C-L: Biomedical Engineering 207. Also C-L: Civil and Environmental Engineering 207. 3 units. *Bryers, Daniels, or Hochmuth*

208. Introduction to Colloid and Surface Science. The colloid state: classification of colloids and the theoretical frameworks and experimental techniques involved in their characterization. Interfaces: includes surface tension and free energy; curved interfaces; adhesion, cohesion, and wetting; surface activity; catalytic and mechanical properties of solid surfaces. Inter-surface forces: the balance of attractive and repulsive forces which operate between colloidal particles and at macroscopic surfaces. Some emphasis will be placed on natural and artificial biomembranes. Prerequisite: consent of instructor. 3 units. *Needham*

210. Intermediate Dynamics. Comprehensive treatment of space kinematics, kinetics of particles and rigid bodies; generalized coordinates and Lagrange's equations; introduction to stability, nonlinear, and random dynamic analysis of flexible, continuous systems. C-L: Civil and Environmental Engineering 210. 3 units. *Dowell*

211. Theoretical and Applied Polymer Science. An advanced course in materials science and engineering, dealing specifically with the structure and properties of polymers. Particular attention is paid to recent developments in the processing and use of modern plastics and fibers. Product design is considered in terms of polymer structures, processing techniques, and properties. 3 units. *Clark or Pearsall*

212. Electronic Materials. An advanced course in materials science and engineering dealing with the various materials important for solid state electronics including semiconductors, ceramics, and polymers. Emphasis is placed on thermodynamic concepts and on defects in these materials. Materials preparation and modification methods for technological applications are discussed in detail. Prerequisite: Engineering 83. 3 units. *Cocks, Gösele, or Tan*

214. Corrosion and Corrosion Control. Effects of environments on the design and utilization of modern engineering alloys. Theory and mechanisms of corrosion, particularly in seawater and atmospheric environments. Microstructural aspects of diffusion, oxidation, hot corrosion, and stress corrosion. Prerequisite: Engineering 83. 3 units. *Cocks or Jones*

215. Biomedical Materials and Artificial Organs. See C-L: Biomedical Engineering 215. 3 units. *Clark*

216. Materials Science and Solar Technology. All aspects of materials science as related to solar energy development. Emphasis is placed on photovoltaic materials and devices, including the relationship of conversion efficiency to material properties and solar cell design. 3 units. *Cocks*

217. Fracture of Engineering Materials. Conventional design concepts and their relationship to the occurrence of fracture. Linear elastic and general yield fracture mechanics. Microscopic plastic deformation and crack propagation. The relationship between macroscopic and microscopic aspects of fracture. Time dependent fracture. Fracture of specific materials. Prerequisites: Engineering 83 and Mechanical Engineering 115. 3 units. *Jones*

218. Thermodynamics of Electronic Materials. Basic thermodynamic concepts and their application to solid state materials with emphasis on technologically relevant electronic materials such as silicon and GaAs. Thermodynamic functions, phase diagrams,

solubilities and thermal equilibrium concentrations of point defects will be covered, as well as non-equilibrium processes and the kinetic phenomena of diffusion, precipitation and growth. 3 units. *Cocks, Gösele, or Tan*

221. Compressible Fluid Flow. Basic concepts of the flow of gases from the subsonic to the hypersonic regime. Effects of friction, heat transfer, and shock on one-dimensional inviscid flow. Potential theory, oblique shock waves, and special calculation techniques in two-dimensional flow. 3 units. *Harman or Shaughnessy*

224. An Introduction to Turbulence. Flow instability and the transition to turbulence. Physical characteristics of turbulent flows, averaging, and the Reynolds equation. Turbulent transport and mixing length theories. The statistical description of turbulence, correlations, and spectra. Fourier transforms. Measurement techniques. 3 units. *Shaughnessy*

226. Intermediate Fluid Mechanics. A survey of the principal concepts and equations of fluid mechanics. Fluid properties. Statics. Basic equations for the control volume. The differential equations of fluid motion. Stream function. Irrotational flow. Navier-Stokes equations. Kelvin's and Crocco's theorem. Applications to two-dimensional incompressible potential flow and to viscous flow in boundary layers. 3 units. *Shaughnessy*

227. Advanced Fluid Mechanics. Flow of a uniform incompressible viscous fluid. Exact solutions to the Navier-Stokes equation. Similarity methods. Irrotational flow theory and its applications. Elements of boundary layer theory. Prerequisite: Mechanical Engineering 226 or consent of instructor. 3 units. *Shaughnessy*

229. Computational Fluid Mechanics and Heat Transfer. An exposition of numerical techniques commonly used for the solution of partial differential equations encountered in engineering physics. Finite-difference schemes (which are well-suited for fluid mechanics problems) are discussed together with the notions of accuracy, conservation, consistency, stability, and convergence. Recent applications of weighted residuals methods (Galerkin), finite-element methods, and grid generation techniques are also presented. Through specific examples, the student will be guided to construct and assess the performance of the numerical scheme selected for the particular type of transport equation (parabolic, elliptic, or hyperbolic). 3 units. *Georgiadis*

230. Modern Control and Dynamic Systems. Dynamic modeling of complex linear and nonlinear physical systems involving the storage and transfer of matter and energy. Unified treatment of active and passive mechanical, electrical, and fluid systems. State-space formulation of physical systems. Time and frequency-domain representation. Controllability and observability concepts. System response using analytical and computational techniques. Lyapunov method for system stability. Modification of system characteristics using feedback control and compensation. Emphasis on application of techniques to physical systems. 3 units. *Garg or Wright*

236. Engineering Acoustics. Fundamentals of acoustics including sound generation, propagation, reflection, absorption, and scattering. Emphasis on basic principles and analytical methods in the description of wave motion and the characterization of sound fields. Applications including topics from noise control, sound, reproduction, architectural acoustics, and aerodynamic noise. Occasional classroom or laboratory demonstration. Prerequisites: Mathematics 111 and Engineering 123 or consent of instructor. 2 units. *Bliss*

237. Aerodynamics. Fundamentals of aerodynamics applied to wings and bodies in subsonic and supersonic flow. Basic principles of fluid mechanics and analytical methods for aerodynamic analysis. Two- and three-dimensional wing theory, slender-body theory, lifting surface methods, vortex and wave drag. Brief introduction to vehicle design, performance, and dynamics. 3 units. *Bliss*

240. Patent Technology and Law for Engineers. The use of patents as a technological data base is emphasized including information retrieval in selected engineering disciplines. Fundamentals of patent law and patent office procedures. 3 units. *Cocks*

245. Applications in Expert Systems. A comprehensive introduction to the key practical principles, techniques, and tools being used to implement knowledge-based systems. The classic MYCIN system is studied in detail to provide historic perspective. Current systems employing combinations of production rules, prototypical knowledge, and frame-based case studies are also introduced. Student term projects consist of the development of individual, unique expert systems using the Texas Instruments Personal Consultant. Knowledge of LISP is not a prerequisite. 3 units. *Wright*

265. Advanced Topics in Mechanical Engineering. Opportunity for study of advanced subjects related to programs within mechanical engineering tailored to fit the requirements of a small group. Prerequisites: approval of Director of Undergraduate or Graduate Studies and instructor. 1 to 3 units. *Staff*

270. Robot Control and Automation. Review of kinematics and dynamics of robotic devices; mechanical considerations in design of automated systems and processes, hydraulic and pneumatic control of components and circuits; stability analysis of robots involving nonlinearities; robotic sensors and interfacing; flexible manufacturing; man-machine interaction and safety considerations. Prerequisites: Mechanical Engineering 230 or equivalent and consent of instructor. 3 units. *Garg*

277. Optimization Methods for Mechanical Design. Definition of optimal design. Methodology of constructing quantitative mathematical models. Nonlinear programming methods for finding "best" combination of design variables: minimizing steps, gradient methods, flexible tolerance techniques for unconstrained and constrained problems. Emphasis on computer applications and term projects. Prerequisite: consent of instructor. 3 units. *Wright*

302. Advanced Thermodynamics. Classical thermodynamics of inherently irreversible processes. Quantum and statistical thermodynamic analysis of properties of real substances and processes. Principles of general thermodynamics. 3 units. *Bejan and Harman*

323. Convective Heat Transfer. Models and equations for fluid motion, the general energy equation, and transport properties. Exact, approximate, and boundary layer solutions for laminar flow heat transfer problems. Use of the principle of similarity and analogy in the solution of turbulent flow heat transfer. Two-phase flow, nucleation, boiling, and condensation heat and mass transfer. Prerequisite: Mathematics 285. 3 units. *Bejan and Chaddock*

324. Conduction and Radiation Heat Transfer. Conduction heat transfer in steady and transient state. Radiation exchange involving absorbing and emitting media including gases and flames, combined conduction and radiation, and combined convection and radiation. Exact and approximate methods of solution including separation of variables, transform calculus, numerical procedures, and integral and variational methods. Prerequisites: Mathematics 230 and Mechanical Engineering 222 or equivalent. 3 units. *Bejan*

325. Aeroelasticity. A study of the statics and dynamics of fluid/structural interaction. Topics covered include static aeroelasticity (divergence, control surface reversal), dynamic aeroelasticity (flutter, gust response), unsteady aerodynamics (subsonic, supersonic, and transonic flow), and a review of the recent literature including nonlinear effects such as chaotic oscillations. Prerequisites: Mathematics 230 and consent of instructor. 3 units. *Dowell*

331. Nonlinear Control Systems. Analytical, computational, and graphical techniques for solution of nonlinear systems; Krylov and Bogoliubov asymptotic method;

describing function techniques for analysis and design; Liapunov functions and Lure's methods for stability analysis; Aizerman and Kalman conjectures; Popov, circle, and other frequency-domain stability criteria for analysis and synthesis. Prerequisite: Mechanical Engineering 230 or consent of instructor. 3 units. *Garg or Wright*

399. Special Readings in Mechanical Engineering. Individual readings in advanced study and research areas of mechanical engineering. Prerequisite: approval of Director of Graduate Studies. 1 to 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

235. Advanced Mechanical Vibrations

300. Advanced Projects in Mechanical Engineering

322. Mechanics of Viscous Fluids

327. Homogeneous Turbulence

328. Turbulent Shear Flow

333. Seminar in Control Systems

372. Finite Element Techniques in Design

English

Professor Fish, *Chairman* (312 Allen); Professor Torgovnick, *Assistant Chairman*; Professor Ferguson, *Director of Graduate Studies* (316 Allen); Professors Anderson, Budd, DeNeef, Gleckner, Jackson, Lentricchia, Nygard, A. Patterson, L. Patterson, Price, Randall, Ryals, B. H. Smith, G. Smith, Strandberg, Tompkins, G. Williams, and K. Williams; Associate Professors Applewhite, Butters, Clum, Gerber, Jones, Mellown, Pope, and Schwartz; Assistant Professors Gaines, Gopen, Moon, Moses, and Porter; Adjunct Assistant Professor Tetel

The department offers graduate work leading to the A.M. and Ph.D. degrees, although normally only students seeking the doctorate are admitted to the department. The A.M. degree, if not already earned elsewhere, may be taken by students en route to the Ph.D. (although it is not required) and by those who elect to leave the doctoral program. A statement of the requirements for the A.M. and Ph.D. degrees may be obtained from the Director of Graduate Studies. The department requires a reading knowledge of at least one foreign language for the Ph.D. degree, the specific language (or languages) to be determined by the student's doctoral committee.

Applicants to the program in English should also furnish a copy (not returnable) of a term paper or other essay in nonfiction prose submitted in fulfillment of a requirement in an academic course.

For Seniors and Graduates

200. ESL Composition. Advanced English composition and conversation for graduate students who are not native speakers of English. Selected readings in nonfiction prose. Designated special sections include forms of oral discourse. Prospective students must submit a writing sample. Credit may not be applied toward a graduate degree. Prerequisite: consent of instructor. 3 units. *Brett*

207. Old English Language and Literature. The pre-Conquest language and representative prose and poetry. 3 units. *Nygard*

208. History of the English Language. Introductory survey of the changes in sounds, forms, and vocabulary of the English language from its beginning to the present, with emphasis on the evolution of the language as a medium of literary expression. C-L: Medieval and Renaissance Studies. 3 units. *Butters, Tetel, or Nygard*

209. Present-Day English. A survey of contemporary linguistic theories applied to modern English; designed for students of literature and teachers of English. 3 units. *Butters or Nygard*

212. Middle English Literature: 1100 to 1500. Selected topics. C-L: Medieval and Renaissance Studies. 3 units. *Fish, Gopen, Nygard, or L. Patterson*

221. Renaissance Prose and Poetry: 1500 to 1660. Selected topics. C-L: Medieval and Renaissance Studies. 3 units. *DeNeef, Fish, A. Patterson, Randall, Schwartz, or G. Williams*

225. Renaissance Drama: 1500 to 1642. Selected topics. C-L: Medieval and Renaissance Studies. 3 units. *A. Patterson, Randall, or G. Williams*

235. Restoration and Eighteenth-Century Literature: 1660 to 1800. Selected topics. 3 units. *Ferguson or Jackson*

241. Romantic Literature: 1790 to 1830. Selected topics. 3 units. *Gleckner or Jackson*

245. Victorian Literature: 1830 to 1900. Selected topics. 3 units. *Ryals*

251. British Literature since 1900. Selected topics. 3 units. *Mellown, Moses, or G. Smith*

263. American Literature to 1865. Selected topics. 3 units. *Anderson, Jones, or Tompkins*

267. American Literature: 1865 to 1915. Selected topics. 3 units. *Budd, Tompkins, or K. Williams*

269. American Women Writers. Selected topics. C-L: Women's Studies. 3 units. *Pope or Tompkins*

275. American Literature since 1915. Selected topics. 3 units. *Lentricchia, Moses, Pope, or Strandberg*

281. Studies in Genre. History, criticism, and theory of literary genres such as the novel, pastoral, epic, and drama. 3 units. *Staff*

283. Feminist Theory and the Humanities. C-L: Religion 269 and Women's Studies. 3 units. *Clark, Orr, Pope, or Tompkins*

285. Major Texts in the History of Literary Criticism. A survey of major critical writings from Aristotle to the present. 3 units. *Staff*

288. Special Topics. Subjects, areas, or themes that cut across historical eras, several national literatures, or genres. 3 units. *Staff*

289. The Theory of the Novel. Major issues in the history and theory of the novel. 3 units. *Moses or Torgovnick*

For Graduates

310. Studies in Old English Literature. Intensive study of major Old English texts. *Nygard*

312. Studies in Middle English Literature. C-L: Medieval and Renaissance Studies. 3 units. *Fish, Nygard, or L. Patterson*

315. Studies in Chaucer. C-L: Medieval and Renaissance Studies. 3 units. *Fish, Nygard, or L. Patterson*

321. Studies in Renaissance Literature. C-L: Medieval and Renaissance Studies. 3 units. *DeNeef, Fish, A. Patterson, Randall, Schwartz, or G. Williams*

324. Studies in Shakespeare. C-L: Medieval and Renaissance Studies. 3 units. *A. Patterson, Porter, or G. Williams*

329. Studies in Milton. C-L: Medieval and Renaissance Studies. 3 units. *DeNeef, Fish, A. Patterson, or Schwartz*

- 337. Studies in Augustanism.** 3 units. *Ferguson or Jackson*
- 338. Studies in a Major Augustan Author.** 3 units. *Ferguson or Jackson*
- 341. Studies in Romanticism.** 3 units. *Gleckner or Jackson*
- 347. Studies in Victorianism.** 3 units. *Ryals*
- 348. Studies in a Major Nineteenth-Century British Author.** 3 units. *Gleckner, Jackson, or Ryals*
- 353. Studies in Modern British Literature.** 3 units. *Mellown, Moses, G. Smith, or Torgovnick*
- 361. Studies in American Literature before 1915.** 3 units. *Anderson, Budd, Jones, Moon, Tompkins, or K. Williams*
- 368. Studies in a Major American Author before 1915.** 3 units. *Anderson, Budd, Jones, Tompkins, or K. Williams*
- 375. Studies in Modern American Literature.** 3 units. *Lentricchia, Moses, or Strandberg*
- 376. Studies in a Modern Author (British or American).** 3 units. *Lentricchia, Mellown, Moses, Pope, G. Smith, Strandberg, or Torgovnick*
- 381. Special Topics Seminar.** 3 units. *Staff*
- 385. Studies in Literary Criticism.** 3 units. *Fish, Lentricchia, Pope, B. H. Smith, or Tompkins*
- 386. Problems in the Theory of Value and Judgment.** See C-L: Literature 300. 3 units. *B. H. Smith*
- 390. Composition Theory and Pedagogy.** Methodologies of teaching composition, with special emphasis on the theories of structural stylistics employed in the University Writing Program (UWP). The course also deals with psychological, sociological, and dramatic considerations in becoming a teacher. All students registering in the course must hold a tutorship in the UWP, must attend the UWP training seminar and all scheduled UWP staff meetings, and will be observed teaching by a UWP director. 3 units, ungraded. *Gopen*
- 391. Tutorial in Special Topics.** Directed research and writing in areas unrepresented by regular course offerings. Prerequisite: permission of the instructor. 3 units. *Staff*
- 392. Tutorial in Journal Editing.** Systematic exposure to all phases of academic journal editing. Restricted to holders of journal editing internships. 3 units, ungraded. *Budd or Lentricchia*
- 393. Professionalism, Theory, and Power in Legal and Literary Studies.** 3 units. *S. Fish*

COURSES CURRENTLY UNSCHEDULED

- 383. Studies in Textual Criticism**

TUTORIALS

Tutorials in specialized subjects of study not available in the courses listed above may be offered to single students or to small groups. Instruction normally will be conducted in weekly sessions, or more frequently if the instructor wishes. Emphasis will be on independent reading and investigation, and on oral and written reports. A substantial amount of writing will be required.

Permission of the instructor is required.

Forestry and Environmental Studies

Professor Dutrow, *Dean* (216 Biological Sciences); Professor Stambaugh, *Director of Graduate Studies* (011 Biological Sciences); Professors Christensen, Jayne and Knoerr; Associate Professors Reckhow, Richardson, and Richter; Assistant Professors Di Giulio, Faust, Maguire, Oren, and Parks; Professors Emeriti Anderson, Hellmers, and Philpott; Adjunct Professors Boyce, Condrell, Dieter, Sizemore, and Steen; Adjunct Associate Professor Healy; Adjunct Assistant Professor Alig; Research Professor Yoho

Major and minor work is offered in the areas of natural resource science/ecology, natural resource systems science, and natural resource economics/policy. Programs of study and research lead to the A.M., M.S., and Ph.D. degrees. College graduates who have a bachelor's degree in one of the natural or social sciences, forestry, engineering, business, or environmental science will be considered for admission to a degree program. Students will be restricted to the particular fields of specialization for which they are qualified academically. Graduate School programs usually concentrate on some area of natural resource science/ecology, systems science, or economics/policy, while study in resource management is more commonly followed in one of the professional master's degree programs of the School of Forestry and Environmental Studies. For more complete program descriptions and information on professional training in forestry or environmental studies, the *Bulletin of Duke University: School of Forestry and Environmental Studies* should be consulted.

The specific degrees available in forestry and related natural resources through the Graduate School are: the A.M. (with or without a thesis), M.S. (with a thesis), and the Ph.D. Students majoring in forestry or environmental studies may be required to demonstrate satisfactory knowledge of one or two foreign languages for the Ph.D. degree. More information on degree and language requirements can be found in the registration and regulations section of this bulletin.

200. Student Projects. Prerequisite: consent of the dean of the School of Forestry and Environmental Studies. Units to be arranged. *Staff*

201. Field Studies. Units to be arranged. *Staff*

204. Forest Inventory, Growth, and Yield. Measurement of land and forests for purposes of management, appraisal, purchase, and sale. Techniques for predicting the growth and future yield of stands by various methods. Fall. 3 units. *Davison*

205. Silviculture. Consideration of the decision-making processes by which prescriptions are formulated for regeneration, tending, and harvesting of forest stands. Biological factors underlying stand manipulation are stressed and economic, harvesting, and utilization variables are discussed as appropriate. Emphasis on principles and techniques that transcend vegetational types or geographic regions. Spring. 4 units. *Oren*

207. Forest Pest Management. Fundamentals of entomology and plant pathology as appropriate to understanding the impacts of insects and diseases on forest productivity and their assessment for integration into forest management. Regional case examples and complexes are evaluated in terms of pest-population, forest-stand dynamics; economic and societal constraints; treatment strategies; monitoring systems; and benefit-cost analysis. This approach seeks to develop predictive capabilities in long-range pest management and decision making. Laboratory is largely field oriented to focus on diagnostics and impact analysis. Fall. 3 units; 4 units with laboratory. *Stambaugh*

208. Fire Behavior and Use. Impacts of destructive agents upon forests; principles of combustion, fire behavior, danger measurement, and suppression; use of fire in forest management. Spring. 3 units. *Staff*

210L. Forest Pathology. Diseases of North American forests and their timbers, with emphasis on current literature and management strategies. Field and laboratory diagnosis. Offered on demand. 3 units; 4 units with laboratory. *Stambaugh*

211L. Applied Ecology and Ecosystem Management. An application of ecological principles to applied resource and environmental problems with an emphasis on the ecosystem as a basic working unit. Perspectives include such topics as land/water interactions, the patchiness concept, succession, energy flow, productivity, mineral cycling, perturbation effects on ecosystems, and limiting factors. Laboratory studies will focus on the team approach to analyzing the biotic and abiotic components of the ecosystem and impact analysis. Fall. 4 units. *Richardson*

213. Forest Ecosystems. Introduction to basic processes regulating ecosystem development, structure and function; examination of ecosystem concepts and the effects of management activities on ecosystem processes and patterns. Elective laboratory, taught as Forestry and Environmental Studies 266, introduces field aspects of forest ecology. Fall. 3 units. *Richter*

215. Environmental Physiology. Examination of the concepts of tolerance, limiting factors, bioenergetics, nutrition, stress physiology, homeostasis, and alleopathy for both plant and animal life. Discussion of procedures for and examples of monitoring physiological perturbations due to resource manipulation. Spring, even-numbered years. 3 units. *Di Giulio and Oren*

216. Applied Population Ecology. Discussion of population dynamics of natural and exploited populations. A quantitative approach with an emphasis on mathematical models and their application to population problems. Spring, odd-numbered years. 3 units. *Maguire*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis will be placed on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: course in general ecology. Given at Beaufort. C-L: Botany 218 and Marine Sciences. 6 units. *Staff*

221L. Forest Soils. Introduction to soil resources and the interactions of forest production, management, and soil fertility. Topics include soil chemistry, physics, development, and nutrient cycling, all from the perspective of maintaining and improving forest productivity. Spring, odd-numbered years. 3 units. *Richter*

230. Weather and Climate. Overview of the science of meteorology and principles of climatology, especially as applied to problems in ecology and natural resource management. Emphasis on the processes and characteristics of weather phenomena and local and regional climates. General introduction to sources of climatic data and climatic data analysis. Fall. 4 units. *Knoerr*

231. Environmental Climatology. Applications of climatology to solving problems in ecology and natural resource management. History of the atmosphere and world climates is considered to provide a perspective on current conditions. Impact of weather on human behavior, property and natural resource management. Spring, on demand. 3 units. *Staff*

232. Microclimatology. Introduction to the microclimatological processes. Discussion of the integration of these processes and the resulting microclimates in the rural (forest, field, and water surface) and urban environments. Methods for modification of the microclimate. C-L: Botany 232. Spring, on demand. 3 units. *Knoerr*

234. Watershed Hydrology. Introduction to the hydrologic cycle with emphasis on the influence of land use, vegetation, soil types, climate, and land forms on water quan-

tity and quality and methods for control. Development of water balance models. Analysis of precipitation patterns, rainfall and runoff, and nonpoint source impacts. Statistical handling and preparation of hydrologic data, simulation and prediction models, introduction to groundwater flow, laboratory and field sampling methods. Fall. 4 units. *Staff*

236. Water Quality Management. Types, sources, and effects of pollutants. Water quality standards and criteria. Engineering approaches to water management. Mathematical models and their application to water quality management. Federal regulations, in particular, the Federal Water Pollution Control Act amendments of 1972 and 1977. Economic and policy analysis for water quality management planning. Fall. 4 units. *Reckhow*

237. Watershed Modeling and Management. Analysis of models for individual hydrologic processes. Evaluation of management-oriented watershed models based on the hydrologic process models. Simulations with watershed models as a basis for management decision making to optimize water yield quantity, timing, or quality under various vegetative, climatic, topographic, and soil conditions. Prerequisite: Forestry and Environmental Studies 234. Spring. 3 units. *Knoerr*

242. Environmental Chemistry. Principles of chemical kinetics and equilibria applied to quantitative description of the chemistry of lakes, rivers, oceans, atmospheric waters, groundwaters and selected treatment processes. Equilibrium, steady state and other kinetic models applied to processes such as the carbonate system, coordination chemistry, precipitation and dissolution, oxidation-reduction, photochemistry, heterogeneous reactions, gas transfer and some aspects of atmospheric chemistry. C-L: Civil Engineering 242. Spring. 3 units. *Faust*

251. Natural Resource Data Analysis. Elements of statistical inference and estimation, including exploratory data analysis, regression, analysis of variance. Fall. 3 units. *Wilkinson*

259. Elements of Forestry. Introduction to forestry topics in biological, economics, policy and management arenas. Multiple use is stressed. Field trip to view silviculture, forest management, and harvesting operations. Spring. 1 unit, intensive. *MacKinnon*

261. Remote Sensing for Resource Management. An examination of remote sensing systems as sources of information in resource management with an emphasis on aerial photography and multispectral scanners. Emphasis on the interpretation of airborne and space imagery. Spring. 3 units. *Davison*

262. Forest Utilization. Introduction to utilization in the managed forest and the principal wood-using industries. Taught as a one-week field seminar. May be taken by non-forestry majors. Spring. 1 unit, intensive. *Staff*

266. Ecology of Southern Appalachian Forests. One-week introduction to forest ecosystems in the southern Appalachians, including species identification, major forest types, patterns in ecosystem distributions, and effects of human activities. 1 unit, intensive. *Richter*

268. Resource Management and Business Practices. Presentation of various aspects of managerial accounting and financial analysis crucial to decision making in the management of natural resources. Consideration of corporate financial statements, sources and uses of funds, breakeven analysis, measurement and projection of business results. Fall. 1 unit, intensive. *MacKinnon*

269. Business Aspects of Natural Resources. Introduction to various business and financial aspects crucial to decision making in the management of natural resources. Specific topics include concepts of managerial accounting, corporate financial statements, measurement and projection of business results, sources of funds and analysis of capital investment decisions, risk and uncertainty in decision making, and survey of com-

puter models used in these areas. Extensive use is made of case studies, problem solving and group discussions. Prerequisite: Forestry and Environmental Studies 270. Fall. 3 units. *MacKinnon*

270. Resource Economics and Policy. The application of economic concepts to private and public sector decision making concerning natural and environmental resources. Investment analysis, benefit-cost analysis. Planning and policy concepts. Prerequisite: introductory course in Economics. C-L: Public Policy Studies 272. Spring. 4 units. *Staff*

283. Environmental Policy and Values. Discussion of varying philosophical approaches to the allocation and use of natural resources and the environment. Views espoused by ecologists, preservationists, naturalists, conservationists, economists, planners, theologians, lawyers, and political scientists are considered. Through extensive readings, students consider who values what in society, and who gets what, when, and how. Prerequisite: consent of instructor. Fall. 3 units. *Staff*

285. Land Use Principles and Policies. Consideration of four major roles of land in the United States: as a producer of commodities, financial asset, component of environmental systems, and location of development. Analysis of market allocation of land, market failure, role of public planning and regulation. 3 units. Fall. *Healy*

299. Independent Projects. Directed readings or research at the graduate level to meet the needs of individual students. Units to be arranged. *Staff*

301. Forest Nutrition Management. Basic processes of soil chemistry and ecosystem nutrient cycling as regulators of forest production. Management impacts such as fertilization, fire, harvest, and biological nitrogen fixation. Laboratories include methods of determining site fertility, assessing forest productivity, and using computer simulation models to guide management decisions in forest nutrition programs. Spring. 4 units. *Staff*

302. Models in Forestry. Students learn how to develop and choose models for use in forestry decisions, analyze the results, evaluate validity and utility, and interpret models developed by others. Emphasis on using models to develop strategy and evaluate policy for culturing forests and related ecosystems. Fall. 3 units. *Boyce*

305. Harvesting Effects on Productivity. Impacts of harvesting on the residual stand, soil properties, water quality, and future site productivity. The integration of harvesting into overall stand management through a full rotation is stressed. Fall, on demand. 2 units. *Staff*

306. Dynamic Modeling of Forest Management Strategies. Simulation of the financial aspects of silvicultural practices when used to produce timber, wildlife habitat, water, range and recreational benefits; economics of production; and trade-offs for multiple benefits. Students use actual forest inventories to devise silvicultural strategies, which are simulated with the system dynamics models DYNAST and STELLA on microcomputers. Fall. 1 unit, intensive. *Boyce and Easterling*

307. Forest Stress. Exploration of principles governing stand growth and its responses to a variety of stresses. Emphasis on climate, soil resources, and competition. Stresses and their reliefs as modifiers of either the availability of resources or the physiological properties of trees. Fall. 3 units. *Oren*

311. Ecological Toxicology. Study of environmental contaminants from a broad perspective encompassing biochemical, ecological, and toxicological principles and methodologies. Discussion of sources, environmental transport and transformation phenomena, accumulation in biota and ecosystems. Impacts at various levels of organization, particularly biochemical and physiological effects. Prerequisites: organic chemistry and vertebrate physiology or consent of instructor. Fall. 3 units. *Di Giulio*

312. Wetlands Ecology. The study of bogs, fens, marshes, and swamps. Emphasis on processes within the ecosystem: biogeochemical cycling, decomposition, hydrology, and primary productivity. Ecosystem structure, the response of these systems to perturbations, and management strategies are discussed. A research project is required. Prerequisites: Forestry and Environmental Studies 211 or equivalent and consent of instructor. Spring, odd-numbered years. 3 units. *Richardson*

316. Case Studies in Environmental Management. Introduces an integrated ecological, economic, and sociopolitical approach to solving resource management problems. Students work in groups to analyze local problems and present their results. Emphasis on setting goals for research, project organization, selection of quantitative tools, preparation of written and oral presentations. Prerequisites: Forestry and Environmental Studies 211 and 251 or equivalents. Spring. 4 units. *Staff*

322. Microbiology of Forest Soils. Ecology of the microbial populations of forest soils, with emphasis on rhizosphere interactions, root pathogenesis, and mycorrhizae. Prerequisite: consent of instructor; mycology and bacteriology are recommended. Spring, odd-numbered years. 4 units, offered on demand. *Stambaugh*

330L. Environmental Monitoring and Instrumentation. Methods of measuring and monitoring the earth's physical environment with emphasis on water and air resources. Characteristics and uses of contemporary sensors, measurement and data acquisition systems. Methods of obtaining and processing computer compatible data records. Includes laboratory. C-L: Botany 330L. Spring, on demand. 4 units. *Knoerr*

331. Water Resource Systems. Introduction to the fundamentals of water resource systems planning and management. Emphasis on optimization, simulation, statistical and economic principles for management of surface and subsurface water resources. Topics include project selection and evaluation, design of standards and regulations, stochastic and deterministic quantity/quality simulation models, water supply and wastewater treatment technologies, decision and risk analysis. Spring. 3 units. *Staff*

332. Air Quality Management and Modeling. Types and sources of atmospheric contaminants including effects of industry, urban development, farming and forestry practices, and recreation. Meteorological effects on air quality. Determination of air quality trends and the application of management systems from a meteorological point of view. Types and applications of air quality models. Performance of air quality models under various emission sources, meteorological, and topographic conditions. Fall, on demand. 3 units. *Staff*

335. Water Quality Modeling. Development and evaluation of simulation models of surface water quality. Mechanistic description of aquatic ecosystems and materials transport. Parameter estimation, methods of solution, including uncertainty analysis. Prerequisites: Forestry and Environmental Studies 234, 236, 350, 355. Fall, odd-numbered years. 3 units. *Reckhow*

350. Applied Regression Analysis. Regression analysis with nonexperimental data using ordinary least squares. Emphasis on assumption violations: consequences and correctives. Analysis of variance and time series analysis using Box-Jenkins methods as time permits. Prerequisite: Forestry and Environmental Studies 251 or equivalent. Spring. 4 units. *Reckhow*

355. Optimization Methods for Resource Management. Introductory survey of optimization techniques useful in resource management and environmental decision making. Numerical techniques for unconstrained optimization, linear programming, dynamic programming, and optimal control methods. Prerequisite: consent of instructor. Fall. 3 units. *Staff*

357. Systems Ecology and Modeling. Concepts of systems analysis and simulation modeling in ecology. Examples emphasize use of systems analysis and modeling to solve environmental management problems. Prerequisites: ecology, introductory statistics, computer programming on microcomputer and TUCC; additional quantitative background desirable. Spring, even-numbered years. 3 units. *Maguire*

361. Forest Resource Management. The integration of biological, socioeconomic, and environmental constraints in planning, organizing, and managing forest properties for maximizing production of timber and other benefits. Emphasis on analysis of growth and yield for regulation of growing stock; application of economic imperatives in decision making, including valuation of forest land and related resources; and use of microcomputers in simulating management options. Prerequisites: Forestry and Environmental Studies 204, 205. Spring. 4 units. *Parks*

363. International Trade and Forest Investment. Overview of world trade patterns in both raw and manufactured forest products in the context of international trade theory. International trade and foreign investment policies affecting natural resource based activities. Long- and short-term supply and demand outlooks for the major producing, potentially producing, and consuming nations are considered in terms of natural resource endowment and investment efficiency. International efforts to develop worldwide supply-demand equilibrium models for forest products. Spring, on demand. 3 units. *Yoho*

366. Mathematical Modeling of Lake and Reservoir Water Quality. Practical application of mathematical models of lake and reservoir water quality. The major objective is to expose the participant to a wide variety of techniques that are useful in predicting the responses of lakes and impoundments to pollutants. Statistical and mass balance models are included. Knowledge of elementary calculus and statistics is recommended. Fall. 1 unit, intensive. *Chapra and Reckhow*

367. Seminar in Forest Resource Management. Examination of concepts, practices, and policies employed in the management of industrial and public forests; discussion of the problems of large-scale forest management. Offered since 1985-86 as the Laird Norton Distinguished Visitor Series. Spring. 1 unit. *MacKinnon*

372, 373. Advanced Natural Resource Economics. Survey of advanced topics in natural resource and environmental economics. Emphasis on renewable resources and public policy. Prerequisite: consent of instructor. Fall and spring. 3 units each. *Staff*

376. USDA Forest Service Inventory Data: Content and Use. Introduction to means of applying inventory data to particular problems. Fall. 1 unit, intensive. *Boyce*

381. Natural Resource Policy. An examination of institutions and processes in the public sector that influence natural resource allocation and use of the environment. Emphasis on political allocation of resources, especially legislative and administrative processes. Topics include the rules of democracy and free enterprise, lobbying, public participation, planning, and advocacy. Prerequisite: consent of instructor. Spring. 3 units. *Staff*

382. International Environmental Problems. Global and transboundary issues; management of international disputes. Environmental consequences of Third World development, including industrial pollution, rural land degradation, deforestation, misuse of chemicals, misuse of biodiversity. Comparative analysis of policies. Spring. 3 units. *Healy*

385. Decision Theory and Risk Analysis. Bayesian decision theory, including conditional probability, subjective probability, utility theory, value of sample information, and multiattribute problems. Behavioral decision theory. Applications of decision theory in resource and environmental policy making. Prerequisite: Forestry and Environmental Studies 251 or equivalent. Spring, even-numbered years. 3 units. *Maguire and Reckhow*

388. Seminar in Resource and Environmental Policy. Discussion of the political, legal, and socioeconomic aspects of public and private action in environmental quality control and management. Prerequisite: consent of instructor. Fall, spring. 1 unit. *Staff*

389. Seminar in Forest and Conservation History. Evolution of resource agencies, forest industries and associations, and conservation/environmental organizations. Public policies for land and resources are compared with priorities and constraints in the private sector. Prerequisite: consent of instructor. Spring, odd-numbered years. 2 units. *Steen*

COURSES CURRENTLY UNSCHEDULED

209. Forest Entomology

263. Harvesting and Transportation Systems

264. Manufacturing Systems

267. Wildland and Wildlife Management

308. Tree Biology

309. Forest Regeneration

310. Forest Productivity and Mineral Cycling

314. Integrated Case Studies in Toxicology

318. Seminar in Ecotoxicology

325. Ecologic Effects of Acid Deposition

338. Micrometeorology and Biometeorology Seminar

384. Special Tax Problems for Industrial Timberland Owners

The University Program in Genetics

Professor Antonovics, *Director* (botany); Professors Amos (microbiology and immunology), Bastia (microbiology and immunology), Boynton (botany), Counce (anatomy), Gillham (zoology), Gross (biochemistry), Holmes (medicine and biochemistry), Joklik (microbiology and immunology), Kredich (biochemistry), Modrich (biochemistry), Moses (anatomy), Nicklas (zoology), C. Ward (zoology), F. Ward (microbiology and immunology), and Webster (biochemistry); Associate Professors Endow (microbiology and immunology), Greene (biochemistry), Greenleaf (biochemistry), M. Hershfield (biochemistry), Hsieh (biochemistry), Keene (microbiology and immunology), Linney (microbiology and immunology), Rausher (zoology), Ruderman (zoology), Steege (biochemistry), and Uyenoyama (zoology); Assistant Professors Burdett (microbiology and immunology), Johnston (botany), Kaufman (biochemistry), Kreuzer (microbiology and immunology), Ostrowski (microbiology and immunology), and Schachat (anatomy); Professor Emeritus Guild (biochemistry); Adjunct Professors Drake (National Institute of Environmental Health Sciences), Judd (National Institute of Environmental Health Sciences), Kunkel (National Institute of Environmental Health Sciences), Lucchesi (University of North Carolina), Resnick (National Institute of Environmental Health Sciences), and Sugino (National Institute of Environmental Health Sciences)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. This is an interdisciplinary program with a faculty drawn from several of the biological science departments (anatomy, biochemistry, botany, microbiology and immunology, and zoology). Graduate students registered in any of the biological sciences departments may apply to the faculty of the genetics program to pursue study and research leading to an advanced degree. It would be helpful if appli-

cants for admission to the Graduate School indicated their interest in the genetics program at the time of application. Requests for information describing more completely the research interests of the staff, facilities, and special stipends and fellowships should be addressed to the Director, Genetics Program (Department of Botany).

215. Genetic Mechanisms. Prerequisite: introductory biochemistry. See C-L: Biochemistry 215. 3 units. *Webster and staff*

268. Molecular Biology II: Nucleic Acids. See C-L: Biochemistry 268; also C-L: Botany 268, Microbiology and Immunology 268, and The University Program in Cell and Molecular Biology. 4 units. *Modrich and staff*

280. Principles of Genetics. See C-L: Zoology 280; also C-L: Botany 280. 3 units. *Antonovics, Boynton, and Gillham (zoology)*

281S. DNA, Chromosomes, and Evolution. Prerequisite: Zoology 160, 180, or Botany 105. See C-L: Zoology 281S. 3 units. *Laurie and Nicklas*

283. Extrachromosomal Inheritance. See C-L: Zoology 283; also C-L: Botany 283. 3 units. *Boynton (botany) and Gillham*

285S. Ecological Genetics. Prerequisites: Botany 180 and 286 or equivalents. See C-L: Botany 285S. 3 units. *Antonovics*

286. Evolutionary Mechanisms. See C-L: Botany 286; also C-L: Zoology 286. 3 units. *Antonovics (botany), Uyenoyama, and H. Wilbur*

288. Mathematical Population Genetics. See C-L: Zoology 288. 3 units. *Uyenoyama*

336. Contemporary Topics in Immunogenetics. See C-L: Microbiology and Immunology 336. 2 units. *Amos and Ward*

Genetics Colloquium. Lectures, discussion sections, and seminars on selected topics of current interest in genetics. Required of all students specializing in genetics. Prerequisites: a course in genetics and consent of instructor. 1 unit. *Antonovics and staff*

Geology

Professor Perkins, *Chairman* (204 Old Chemistry); Professor Heron, *Director of Graduate Studies* (205 Old Chemistry); Professor Pilkey; Associate Professors Baker, Corliss, Johnson, Karson, Rosendahl, and Strelitz

The Department of Geology offers graduate work leading to the M.S. and Ph.D. degrees. An undergraduate degree in geology is not a prerequisite for graduate studies, but a student must have had or must take a summer field geology course (or equivalent experience), mineralogy, igneous and metamorphic rocks, stratigraphy or sedimentation, and structural geology. In addition, the student must have had one year of college chemistry, one year of college physics, and mathematics through calculus.

Graduate courses and research in the Department of Geology provide specialized training in the fields of facies analysis, sedimentary petrology, geological oceanography and limnology, coastal geology, micropaleontology, paleoceanography, geophysics, low-temperature geochemistry, igneous petrology, high-temperature geochemistry, and structural geology and tectonics. An acceptable thesis is required. There is no language requirement for the M.S. degree.

For Seniors and Graduates

200. Beach and Coastal Processes. The study of sedimentary processes, and geomorphology of nearshore environments with emphasis on both developed and undeveloped barrier island systems. 3 units. *Pilkey*

- 203. Physical Oceanography.** Physical processes in the oceans: the physical properties of seawater, the dynamics of currents, waves and tides, and the transmission of light and sound in the sea. Prerequisite: Physics 41 or 51. (Given at Duke Marine Lab, Beaufort.) C-L: Marine Sciences 203. Half course. *Johnson*
- 206S. Principles of Geological Oceanography.** Geological aspects of the ocean basins including coastal to deep water sediment types and sedimentation processes, sea floor physiography and environmental problems. 3 units. *Pilkey*
- 208S. Paleooceanography.** Geology, paleoceanography, evolution of the oceans, ocean basins, and marine biota based on analysis of deep-sea sedimentary sequences. 3 units. *Corliss*
- 209S. Marine Sediments.** Sedimentary processes in nearshore, shelf, and deep-sea environments. Emphasis on field methods and laboratory analyses. (Given at Beaufort.) C-L: Marine Sciences. 3 units. *Johnson*
- 212. Carbonate Facies Analysis: Recent and Ancient.** Origin, distribution, and diagenetic alteration of recent carbonate sediments and their ancient analogs. Prerequisite: Geology 111. 3 units. *Perkins*
- 214S. Sedimentary Petrography.** Descriptive and interpretive analysis of sediments and sedimentary rocks in thin section, with an emphasis on diagenesis. Prerequisite: consent of instructor. 3 units. *Perkins*
- 215. Clastics Facies Analysis: Recent and Ancient.** Modern clastic depositional systems and their ancient analogs. Prerequisite: Geology 111. 3 units. *Heron*
- 216. Field Analysis of South Florida Carbonates.** Analysis of recent sediments and organisms and their Pleistocene analogs. One-week field trip. Prerequisite: Geology 111 or consent of instructor. 1 unit. *Perkins*
- 217. Field Analysis of Ancient Sedimentary Sequences.** Regional analysis of ancient clastic and carbonate systems. One-week field trip. Prerequisite: Geology 111 or consent of instructor. 1 unit. *Staff*
- 230S. Advanced Topics in Structural Geology and Tectonics.** Selected topics related to the deformation of rocks, ranging from microstructure to plate tectonics. Prerequisite: Geology 130 or consent of instructor. 3 units. *Karson*
- 233. Oceanic Crust and Ophiolites.** Structure, tectonics, petrology, and geochemistry of oceanic spreading environments and ophiolite complexes. Prerequisites: Geology 106 and 130 or consent of instructors. 3 units. *Karson*
- 236. Lithosphere Plate Boundaries.** Plate tectonics and the geological and geophysical expression of orogenic belts, spreading centers, transform faults, subduction zones. Prerequisite: Geology 130 or consent of instructors. 3 units. *Karson and Rosendahl*
- 249. Marine Micropaleontology.** Introduction to marine microfossils, basic principles of micropaleontology and stable isotope geochemistry with applications to paleoceanography. Lectures and laboratory. 3 units. *Corliss*
- 251. Physics of the Earth.** Origin, primeval evolution, rotation, potential fields, paleomagnetism, gravity anomalies, earthquake seismology, thermal properties, internal structure of the earth, and thermodynamics of plate motions. Prerequisites: Geology 41 and Chemistry 12 and Mathematics 32 and Physics 52 or consent of instructor. 3 units. *Strelitz*
- 252. Exploration Seismology.** Elastic wave theory, reflection and refraction of acoustic waves, field methodologies, computer processing, and interpretation of seismic data.

Prerequisites: Geology 41 and Mathematics 32 and Computer Science 51 and Physics 52 or consent of instructor. 3 units. *Rosendahl*

260S. Hydrocarbon Exploration. Origin, migration, and accumulation of hydrocarbons with emphasis on exploration techniques. Prerequisites: Geology 111 and 251. 3 units. *Perkins and Rosendahl*

270. Sedimentary Geochemistry. Chemistry of aqueous solutions and authigenic minerals in sedimentary systems. Prerequisites: Chemistry 12 and Mathematics 32. 3 units. *Baker*

271. Isotope Geochemistry. Theory and applications of stable and radioactive isotope distributions in nature. Prerequisites: Chemistry 12 and Mathematics 32. 3 units. *Baker*

272. Biogeochemistry. Processes controlling the circulation of carbon and biochemical elements in natural ecosystems and at the global level, with emphasis on soil and surficial processes. Prerequisite: Chemistry 12, Botany 146L, or equivalent. C-L: Botany 272. 3 units. *Schlesinger*

275. Economic Geology. Geology and geochemistry of ore deposits. Prerequisite: consent of instructors. 3 units. *Baker*

281S. Advanced Topics in Igneous Petrology. Current topics in igneous petrology including andesite petrogenesis, ocean ridge basalts, and experimental petrology. Prerequisites: Geology 105 and 106. 3 units. *Staff*

283S. Experimental Methods in Geology. Theory and application of experimental techniques in igneous and metamorphic petrology and high- and low-temperature geochemistry, with examples from recent literature. Prerequisites: Geology 105 and 106 or consent of instructor. 3 units. *Staff*

292. Computer Methods in Geology. Techniques used in the geological sciences including simulation and forward modelling, inverse and least squares methods, statistical methods and exploratory data analysis as well as graphics. Prerequisites: Mathematics 32 and Computer Science 51, or consent of instructor. 3 units. *Strelitz*

295S. Advanced Topics in Geology. Topics, instructors, and credits to be arranged each semester. *Staff*

For Graduates

371, 372. Advanced Topics in Geology. To meet the individual needs of graduate students for independent study in various environmental sedimentary fields. 1 to 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

253S. Geophysics

Germanic Languages and Literature

Associate Professor Borchardt, *Chairman*; Associate Professor Rolleston, *Director of Graduate Studies* (102 Languages); Associate Professor Alt; Assistant Professor Morton

The Department of Germanic Languages and Literature offers graduate work leading to the A.M. degree. Students who expect to major in German should have had sufficient undergraduate courses in Germanic languages to enable them to proceed to more advanced work.

Students who wish to take courses in German as a related field should normally have completed a third-year course (in exceptional cases, a second year) of college German with acceptable grades.

For Seniors and Graduates

200S. Proseminar. Fundamental course for advanced study of German; literary history, schools of criticism, practical exercises in interpretation, and research methods. 3 units. *Alt*

201S, 202S. Goethe. His life and works, in the light of his lasting significance to German and world literature. 201S: lyrics, prose, fiction, and selected dramas. 202S: *Faust I and II*. 3 units each. *Morton*

205, 206. Middle High German. The language and literature of Germany's first classical period. C-L: Medieval and Renaissance Studies. 3 units each. *Staff*

207S. German Romanticism. The principal writers of the period from 1795 to 1830. 3 units. *Alt or Rolleston*

209S. Drama. Studies in the German-speaking theater with emphasis on the nineteenth century. 3 units. *Alt*

210S. The Eighteenth Century. The culture of reason, progress, and the individual in early modern philosophy and literature. Leibniz, Lessing, Herder, Kant, Schiller. 3 units. *Morton*

211S. Nineteenth-Century Literature. From the end of romanticism through realism. 3 units. *Alt*

214S. The Twentieth Century. Literature of the twentieth century presented through representative authors. 3 units. *Rolleston*

215S. Seventeenth-Century Literature. Leading writers of the baroque, viewed against the background of their time. C-L: Medieval and Renaissance Studies. 3 units. *Borchardt*

216. History of the German Language. Development of the phonology, morphology, and syntax of German from the beginnings to the present. C-L: Linguistics and Medieval and Renaissance Studies. 3 units. *Staff*

217S. Renaissance and Reformation Literature. The period from 1400 to about 1600. C-L: Medieval and Renaissance Studies. 3 units. *Borchardt*

218S. The Teaching of German. A survey of modern teaching techniques: problems in the teaching of German on the secondary and college levels. Analysis and valuation of textbooks and related audiovisual materials. 3 units. *Alt*

219. Applied Linguistics. The application of modern linguistic principles to a systematic study of the phonetics, morphology, and syntax of modern German. Prerequisite: consent of instructor. C-L: Linguistics. 3 units. *Staff*

230S. Lyric Poetry. Studies in poetry and poetic theory. From Goethe and the romantics to Rilke, Benn, and contemporary authors. 3 units. *Rolleston*

COURSES CURRENTLY UNSCHEDULED

321, 322. Germanic Seminar

Health Administration

Professor McMahon, *Chairman*; Associate Professor Taylor, *Director of Graduate Studies*; Professors Jaeger and Warren; Associate Professor Falcone; Assistant Professor Smith; Adjunct Associate Professors Donelan, Winfree, and Yaggy; Adjunct Assistant Professors Cahill, Martin, and Moore

The Department of Health Administration offers graduate work leading to the M.H.A. degree. The graduate program is offered through two academic years and leads principally toward a career in the corporate management of hospitals and other health services organizations. Most of the required first year courses are taken in the Fuqua School of Business and second year electives are also available there. A ten-week administrative internship at an approved health care institution or agency is required between the first and second year. Students without previous administrative experience in the health field are encouraged to apply for a twelve-month administrative fellowship following graduation. Admission to the program is based upon the capability for graduate study and demonstrated leadership potential of the candidate.

301. Health System and the Environment. Introduction to the organizational and professional systems which provide health care services, including past, present, and future perspectives and relationships among institutions, professionals, government, and the private sector. Emphasis is on the changing and dynamic nature of the health care environment and resulting system responses. 3 units. *Staff*

302. Organizational Behavior in Health Systems. This course will consider the leadership roles of the manager and his or her responsibility for maintaining a productive organization in a changing economic environment. It will develop models for considering consequences of the interaction of members of the organization with changing technology and other externalities, and will examine how appropriate leadership behavior frequently determines the success or failure of an institution. 3 units. *Taylor*

303-304. Health Systems and the Environment—Laboratory. A laboratory course to facilitate familiarity with the operation of health facilities and the appreciation of the challenge of planning, organizing, financing, staffing, controlling, and evaluating the provision of health care services. (To be taken concurrently with Health Administration 301 and 302.) 1 unit each. *McMahon*

311-312. Leadership Seminar. Designed as the integrating course of the program, this two-semester seminar provides a forum for ongoing interaction among student/faculty/practitioners in the context of exploring the concepts and implementation of strategies for both causing and responding to the dynamics of change in health organizations. 1 unit each. *McMahon*

321-322. Strategic Planning for Health Services. A comprehensive, two-semester course which applies and extends courses taken in the Fuqua School and draws upon several disciplinary areas in order to develop a conceptual and operational basis for management control over designing, planning, allocating, utilizing, and evaluating resources used in providing health services. 3 units each. *Staff*

325. Health Law for Management. Introduction to law and the legal approach to problem solving in health care; provides background for understanding the role of law and legal institutions in affecting access, availability, cost, quality, and evaluation of health care services. 3 units. *Warren*

327. Financial Management for Health Care Organizations. Provides a comprehensive overview of both short-run and long-term issues in health care financial management. Topics include cash management, collection and disbursement techniques, cash forecasting, short-run financial planning, receivables management, capital budgeting under uncertainty, dividend policy, and capital structure decisions. 3 units. *Taylor*

331. Human Resources Management. Course focuses on the responsibilities and role of all managers and supervisors in regard to human resource management, the issues in developing a proactive human resource planning model with an adaptable framework, and strategies for responding to events, trends, and issues affecting human resources. 3 units. *Staff*

341, 342. Advanced Seminar in Health Care Institutional Management. An integrating sequence of case studies in institutional and programmatic settings designed to provide students the opportunity to study actual problems and to propose solutions in the classroom setting. 3 units each. *Smith*

343. Comparative Health Systems. Against the backdrop of the United States health system, including the Veterans Administration system, the course examines the potential for innovation and common problems in health services delivery from an international perspective. 3 units. *Falcone*

352. Health Services for the Aged. Covers socioeconomic, cultural, and demographic trends affecting health and medical care for older persons; political and legal developments; health care facilities and alternatives to institutionalization; geriatrics and gerontology for the administrator. 3 units. *Falcone and Warren*

354. Quality Assurance, Risk Management, and Liability Insurance. A seminar to acquaint students with the theory and concepts of coordinated quality assurance and risk management in health care organizations. Attention is given to the steps involved in designing and implementing an effective QA/RM program and various insurance mechanisms. 3 units. *Moore and Warren*

356. Health Policy Analysis. The major purpose is to broaden and enrich students' perspectives on the health system through an examination of policy determinants, with a focus on political system variables, structures, and processes, against the backdrop of environmental constraints. 3 units. *Falcone and Warren*

357. Current Legal Issues in Health Administration. A seminar which covers current regulatory, legislative, and judicial matters which affect the administration of health services. Emphasis is on identifying governmental developments, such as new Medicare or OSHA regulations, and analyzing their potential impact on the field, as well as surveying possible legal and administrative responses. Both current hospital literature and legal materials, including the Federal Register, are used in class participation. 3 units. *McMahon and Warren*

358. Cost Benefit Analysis. Demonstrates the utility of logical modes in management and planning decisions. Since this logic is usually quantifiable within limits, the course reviews problem conceptualization, methodology, and techniques for determining the costs, benefits, effectiveness, and efficacy of decisions regarding optimal deployment of resources. 3 units. *Falcone*

362. Planning and Managing Alternative Delivery Systems. This course is designed to examine the current state of development of alternative delivery systems (health maintenance organizations, preferred provider organizations, competitive medical plans and other mechanisms to control costs by changing provider incentives) and to explore likely future directions such systems will take. 3 units. *McMahon*

371, 372. Directed Research. Individual studies and health services projects by arrangement. 3 units each. *Staff*

History

Professor Warren Lerner, *Chairman* (235 Allen); Professor Mauskopf, *Director of Graduate Studies* (233A Allen); Professors Bergquist, Cahow, Cell, Chafe, Colton, C. Davis,

Durden, Holley, Oates, Richards, Roland, A. Scott, W. Scott, TePaske, Witt, and Young; Associate Professors Dirlik, English, Gaspar, Gavins, Goodwyn, Gordon, Keyssar, Koonz, Kuniholm, Miller, Nathans, Reddy, and Wood; Assistant Professors R. Davis, Ewald, Green, Herrup, Neuschel, and Robisheaux; Professors Emeriti Ferguson, Franklin, Parker, Preston, Ropp, and Watson

The Department of History offers graduate work leading to the A.M. and Ph.D. degrees. Candidates for the A.M. degree must have a reading knowledge of at least one ancient or modern foreign language related to their programs of study and have completed successfully a substantial research paper, or two seminar papers, normally the product of a year's seminar or two semester courses. The paper(s) must be approved by two readers, the supervising professor and a second professor from the graduate staff. Students anticipating a May degree must have their papers read and approved by April 15; those anticipating a September degree must have their papers read and approved by August 1.

Candidates for the degree of Doctor of Philosophy prepare themselves for examinations in four fields, at least three of which shall be in history. The choice of fields is determined in consultation with the student's supervisor and the Director of Graduate Studies. The department offers graduate instruction in the broad areas of North America; Latin America; Great Britain and the Commonwealth; ancient, medieval, and Renaissance Europe; modern Europe; Russia; Japan; China; South Asia; military; history of science, technology, and medicine; and in the comparative and thematic fields of women's history, environmental history, diplomatic history, labor history, and slave societies. The candidate for the Ph.D. degree must have a reading knowledge of two foreign languages to be picked in conjunction with the candidate's supervisor. In certain cases, an alternative to the second language may be chosen if approved by both the candidate's supervisor and the Director of Graduate Studies. Such an alternative must take the form of successful completion of a course or courses which would appreciably increase the candidate's methodological proficiency; such as a graduate course in statistics, archaeology, demography, numismatics, cartography, or a summer training program for developing methodological skills. A course or courses in a discipline outside history—anthropology, literature, sociology, political science, ecology, geography, etc.—will not necessarily qualify as an alternative to a second language. Also, the alternative must be in addition to any previous undergraduate work in the methodology. Whether satisfied by two languages or by one language and an alternative, the requirement must be met prior to the preliminary examination.

Ancient History. For courses in ancient history which may be taken for credit in either history or classical studies, see Classical Studies.

For Seniors and Graduates

Students may receive credit for either semester of a hyphenated course at the 200 level without taking the other semester if they obtain written consent from the instructor.

201S. The Russian Intelligentsia and the Origins of the Revolution. Origin and dynamics of the Russian revolutionary movement, the intelligentsia, and the emergence of the labor movement. 3 units. *Miller*

202S. The Russian Revolution. An analysis of the Bolshevik seizure of power in 1917 and the establishment of a revolutionary society and state during the 1920s. 3 units. *Miller*

207, 208. Constitutional History of Britain: The Rise of the Common Law. The origins and development of Britain's law and constitution, related to its setting in a changing society. C-L: Comparative Area Studies and for 207: Medieval and Renaissance Studies. 3 units each. *Herrup*

212. The American Indian in the Revolutionary Era, 1760-1800. 3 units. *Wood*

215-216. The Diplomatic History of the United States. (Not open to undergraduates who have had History 121, 122.) 6 units. *C. Davis*

217S, 218S. Western Europe in the Twentieth Century. Topics in political and social history: Europe in 1900; the impact of two world wars; the social politics of the great depression; fascism and nazism; economic recovery and changes after 1945. 3 units each. *Colton*

219S, 220S. History of Science and Technology. The interaction of science and technology in the Western world from earliest times to the present. 3 units each. *Mauskopf and Roland*

221. Problems in the Economic and Social History of Europe, 1200-1700. C-L: Medieval and Renaissance Studies. 3 units. *Witt*

222. Problems in the Intellectual History of the European Renaissance and Reformation. Prerequisites: History 194 and reading knowledge of German, French, or Italian. C-L: Medieval and Renaissance Studies. 3 units. *Witt*

226. Topics in the Labor History of the United States. 3 units. *Keyssar*

227-228. Recent United States History: Major Political and Social Movements. C-L: Women's Studies. 6 units. *Chafe*

229S, 230S. Revolution in Modern Europe, 1789-1919. The French Revolution, the revolutions of 1830 and 1848, the Paris Commune, and the Russian and German revolutions of 1917 and 1918-1919. Emphasis on the evolution of historians' efforts at explanation of revolutions and on the relationship between social and political change. 3 units each. *Reddy*

231S, 232S. Problems in the History of Spain and the Spanish Empire. 3 units each. *TePaske*

233. Slave Resistance and Social Control in New World Societies. The operation of slave societies in the Americas from the sixteenth to the nineteenth centuries focusing on master-slave relations and slave resistance. 3 units. *Gaspar*

234S. Political Economy of Development: Theories of Change in the Third World. See C-L: Political Science 234S; also C-L: Anthropology 234S and Sociology 234S. 3 units. *Bergquist, Fox, Gereffi, Smith, and Valenzuela*

237S. Europe in the Early Middle Ages. C-L: Medieval and Renaissance Studies. 3 units. *Young*

238S. Europe in the High Middle Ages. C-L: Medieval and Renaissance Studies. 3 units. *Young*

239S. History of Socialism and Communism. Problems in the origins and development of socialist and communist movements. 3 units. *Lerner*

241-242. United States Constitutional History. 241: to 1865; 242: 1865 to the present. 6 units. *Cahow*

243-244. Marxism and History. Critical examination of Marxist theory and its relevance to historical understanding and explanation. 6 units. *Dirlik*

245, 246. Social and Intellectual History of China. 3 units each. *R. Davis and Dirlik*

247. History of Modern India and Pakistan, 1707-1857. Analysis and interpretation, with special emphasis on social and economic change. 3 units. *Richards*

248. History of Modern India and Pakistan, 1857 to the Present. 3 units. *Richards*

249-250. Social and Intellectual History of the United States. The interplay of ideas and social practice through the examination of attitudes and institutions in such fields as science and technology, law, learning, and religion. 6 units. *Holley*

253S, 254S. European Diplomatic History, 1871-1945. Origins of the First and Second World Wars, the diplomacy of the wars, and the peace settlements which followed them. 3 units each. *W. Scott*

259. Archaic Greece. See C-L: Classical Studies 221. 3 units. *Oates or Rigsby*

262. Problems in Soviet History. Studies in the background of the Revolution of 1917 and the history and politics of the Soviet state. 3 units. *Lerner*

265S. Problems in Modern Latin American History. 3 units. *Bergquist*

266. Late Antiquity. See C-L: Classical Studies 226. 3 units. *Rigsby*

267S. England in the Sixteenth Century. C-L: Medieval and Renaissance Studies. 3 units. *Herrup*

268S. England in the Seventeenth Century. C-L: Medieval and Renaissance Studies. 3 units. *Herrup*

269S-270S. British History, Seventeenth Century to the Present. Historiography of social structure and social change: English Revolution, party, the Industrial Revolution, class and class consciousness, Victorianism, and the impact of war in the twentieth century. 6 units. *Cell*

273S, 274S. Topics in the History of Science. Critical stages in the evolution of scientific thought. 3 units each. *Mauskopf*

277S. The Coming of the Civil War in the United States, 1820-1861. 3 units. *Durden*

278S. The Civil War in the United States and Its Aftermath, 1861-1900. 3 units. *Durden*

279, 280. Health, Healing, and History. The development of medicine within the broader cultural context from prehistory to the twentieth century. Not open to students who have had History 181, 182. 3 units each. *English*

282S. Canada. See C-L: Political Science 282S; also C-L: Anthropology 282S and Sociology 282S. 3 units. *Leach*

284S. Feminist Theory and the Social Sciences. Examination of feminist modes of inquiry in the social sciences. The relationship of gender in economic, political, social, and cultural systems and the resulting shifts in social science disciplines. 3 units. *Chafe, Neuschel, O'Rand, or C. Smith*

285S, 286S. Oral History. Research on race relations and civil rights in the United States in the twentieth century using techniques of oral history. 3 units each. *Chafe and Goodwyn*

Required Courses for Graduates

301-302. Research Seminar in History. Either this seminar or History 307-308 is required of all entering first-year doctoral candidates in history. 6 units. *Staff*

307-308. Seminar in United States History. Either this seminar or History 301-302 is required of all entering first-year doctoral candidates in history. 6 units. *Staff*

312. Seminar in the Teaching of History in College. The work in this course is intended to acquaint students with the problems involved in teaching history in college. Required of all candidates for the degree of Doctor of Philosophy who are in residence for two years at Duke. As an alternate method of meeting this requirement, a graduate student may, in cooperation with a member of the faculty, serve a one-semester teaching apprenticeship. No credit. Supervised by Director of Graduate Studies.

314. Historical and Social Science Methodology. Methods used in historical research with emphasis upon the various social science approaches. 3 units. *Wood*

History 314 is required of all candidates for the Ph.D. degree who are in residence for two years at Duke University.

Colloquia and Seminars for Graduates

351-352. Colloquia. Each colloquium deals with an aspect of history by means of readings, oral and written reports, and discussion, with attention to bibliography. Ad hoc colloquia may be worked out during registration in the various fields represented by members of the graduate faculty; these colloquia do not appear on the official schedule of courses. In some instances, students may take the equivalent of a research seminar in conjunction with the colloquium and will be credited with an additional 6 units by registering for 371.1-372.1, etc.

371-372. Research Seminars. To be taken either in conjunction with colloquia listed above or by special arrangement with appropriate graduate instructors when research seminars in a desired area are not offered. These seminars do not appear on the official schedule of courses. 6 units. *Staff*

Independent Study

399. Supervised independent study and reading, with consent of professor. 3 units.

N.B. For the most current listing of scheduled courses, please refer to the most recent Duke University official schedule of courses printed twice a year.

The Master of Arts Program in Humanities

Professor Charles R. Young, *Director* (history)

The Master of Arts Program in Humanities is an interdepartmental program and is tailored to the needs of individual students. The candidate defines a theme and selects appropriate course work with the aid and approval of a supervising committee. Thirty units of course work and proficiency in a foreign language are required for completion of the program. The degree may be earned with or without a thesis. The candidate who chooses not to submit a thesis will submit instead at least two substantial papers arising from course work for review by committee members, and meets with them to discuss his or her program in a final master's colloquium.

The program is open to holders of undergraduate degrees in any discipline who can demonstrate sufficient background in humanities to permit study at the graduate level. Admission is by regular application to the Graduate School. Students may enroll full time or part time (minimum of 3 units per term). Students considering entering the program may enroll in an appropriate graduate course or courses through the Office of Continuing Education, at the same time making their interest known to the Director of the Humanities Program.

The Master of Arts in Liberal Studies Program

Diane Sasson, Ph.D., *Director*

This interdisciplinary program allows individuals with a variety of professional and personal educational interests the flexibility to pursue their interests across traditional disciplinary boundaries. The program is managed by an interdepartmental committee which advises students and directs their course of study. Students study primarily on a part-time basis and choose from an array of interdisciplinary courses developed specifically for this program. In addition to the special liberal studies courses, students select other graduate-level courses that fit their individual needs and interests.

The MALS program consists of nine courses and a final project. These courses are offered during three academic terms (fall, spring, and summer) and may be taken either full-time or part-time. For more information on specific courses and other program requirements, a separate bulletin on the Master of Arts in Liberal Studies may be requested from the program director (120 Allen Building, Duke University, Durham, North Carolina 27706).

The Ph.D. Program in Literature

Professor Jameson, *Chairman* (Graduate Program in Literature); Professor A. Patterson, *Director of Graduate Studies* (Graduate Program in Literature and English); Professors Fish (English and law), Lentricchia (English and Graduate Program in Literature), Pérez Firmat (Spanish and Graduate Program in Literature), Mudimbe (French and Graduate Program in Literature), B. H. Smith (Graduate Program in Literature and English), Stewart (French), and Tompkins (English); Associate Professors DeNeef (English), Rolleston (Germanic languages and literature), and Thomas (French); Visiting Professor Dorfman (Literature and Latin American Studies)

The interdepartmental program leading to a Ph.D. in literature offers to qualified students the opportunity to develop individual courses of study with a strong emphasis on interdisciplinary work, literary theory, and cultural studies, while at the same time building strength in one or more of the national literatures. The program offers both introductory courses (the 250 series) and more specialized seminars (the 280 series), as well as tutorials (300) in specific research projects or problems.

For tutorials, advising, and dissertation supervision the program draws also on the expertise of other faculty, such as Associate Professor Wharton (Art); Professor Newton, and Associate Professor Burian (Classical Studies); Professors Ryals and L. Patterson (English); Professor Tetel and Associate Professors Orr and Kaplan (French); Professor Borchardt (German); Assistant Professor Roderick (Philosophy); and Professor Wardropper (Spanish).

Students entering the program must present evidence of ability to read one language other than English, and must acquire reading competence in a second language before taking their preliminary examinations.

More information on the program and a full descriptive brochure is available from Professor Patterson, Director of Graduate Studies, 305 Carr Building, Duke University, Durham, North Carolina 27706.

251. History of Criticism. A historical survey of critical and philosophical concepts affecting the definition and evaluation of literature from Plato and Aristotle through the nineteenth century. 3 units. *DeNeef, Lentricchia, or Pérez Firmat*

252. Criticism and Literary Theory in the Twentieth Century. Introduction to critical movements, philosophies, and strategies informing contemporary theories of literature: deconstruction, feminism, formalism, Marxism, New Criticism, phenomenology, psychoanalysis, structuralism. 3 units. *Rolleston, with guest lecturers*

253. Philology, Linguistics, and the Roots of Literature. A survey of the various ways in which language and literature interact, with an introduction to philology and historical linguistics. 3 units. *Thomas*

(The 280-290 series implies prior knowledge of literary theory, past and present; these courses are open to graduate students and qualified seniors only.)

281. Paradigms of Modern Thought. Specialized study of the work of individual thinkers who have modified our conceptions of human reality and social and cultural history, with special emphasis on the form and linguistic structures of their texts considered as "language experiments." Topics will vary from year to year, including: Marx and Freud; J.-P. Sartre; Walter Benjamin; etc. 3 units. *Jameson*

282. Contemporary Literary Theory. Specialized studies in literary theory from Saussurean linguistics to the present day (e.g., deconstruction, feminism, new historicism, neopragmatism, reception theory). 3 units. *Fish, Jameson, Lentricchia, Patterson, or Tompkins*

283. Modernism. Aspects of the "modern," sometimes with emphasis on the formal analysis of specific literary and nonliterary texts (Joyce, Kafka, Mahler, Eisenstein); sometimes with a focus on theories of modernism (Adorno), or on the modernism/post-modernism debate, or on the sociological and technological dimensions of the modern in its relations to modernization, etc. 3 units. *Jameson or Lentricchia*

284. The Intellectual as Writer. History and theory of the literary role of the intellectual in society (e.g., in Augustan Rome, the late middle ages, the Renaissance, America, Latin America). 3 units. *Lentricchia, Mudimbe, or Patterson*

285. Literature and Ideology. The theoretical problem of the relationship between literature and ideology, explored through the cultural history of genres, major writers, or aesthetic movements. 3 units. *Jameson, Lentricchia, or Patterson*

286. Topics in Legal Theory. A consideration of those points at which literary and legal theory intersect (e.g., matters of intention, the sources of authority, the emergence of professional obligation). 3 units. *Fish*

287. Problems in Narrative Analysis. An introduction to contemporary theories and methods of narrative analysis (Greimas, Barthes, Hayden White, etc.), with emphasis on a specific area, e.g., historiography, film, sub-genres of the novel, cognitive discourse. 3 units. *Jameson*

288. Basic Issues in the History of Literary Theory. Issues include attempts to define literature, divergent views of its social functions and psychological effects, and contemporary controversies regarding literary meaning and interpretation. Readings range from classic texts in philosophy of art to contemporary essays in critical theory. 3 units. *H. Smith*

289. Topics in Feminist Theory. 3 units. *Staff*

290. Topics in Psychoanalytic Criticism. 3 units. *Staff*

291. Topics in Popular Culture and the Media. 3 units. *Staff*

300. Problems in the Theory of Value and Judgment. An advanced seminar dealing with classic problems relating to the concept of value and evaluative behavior (e.g., standards, judgments, canon-formation, taste), as illuminated by contemporary work in critical theory, anthropology, economics, sociology, etc. C-L: English 386. 3 units. *B. H. Smith*

The University Program in Marine Sciences

Professor Costlow, *Director* (zoology); Professor Ramus, *Assistant Director for Academic Programs and Director of Graduate Student Affairs* (botany); Professors Gutknecht (physiology), McClay* (zoology), Pilkey† (geology), and Searles* (botany); Associate Professors C. Bonaventura (physiology), J. Bonaventura (physiology), Forward (zoology), Johnson (geology), Sullivan (biochemistry), and Sutherland (zoology); Professor Emeritus Bookhout (zoology)

Graduate students from any and all academic disciplines are encouraged to take professional training at the Marine Laboratory. The program operates year-round, providing course work in the marine sciences, an active seminar program, and facilities sup-

*In residence during summer only.

†In residence during spring only.

porting dissertation research. Resident graduate students represent the Departments of Biochemistry, Botany, Forestry and Environmental Studies, Geology, Physiology, and Zoology. Ordinarily, dissertation advisers are resident as well, although this need not be the case. The Marine Laboratory has available several graduate student instructional assistantships and fellowships during the academic year, including summer. In addition, tuition credits obtained from fellowship support may be applied to courses given both at the Marine Laboratory and the Durham campus.

Persons interested in graduate work in marine sciences should apply through one of the appropriate departments. Forms may be obtained from the Graduate School.

Applications for summer courses at the laboratory should be addressed to the Admissions Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516. Additional information and the application form are included in the *Bulletin of Duke University: Marine Laboratory*. The application for enrollment in summer courses at the laboratory should be accompanied by transcripts of undergraduate and graduate work. Applications should be received as early as possible. Graduate students planning to enroll in courses or seminars offered during the fall or spring at the Marine Laboratory should notify the Admissions Office of the Marine Laboratory of such intent *prior* to the beginning of the respective semester.

Students registering for research should do so under the appropriate departmental numbers.

The following courses are offered at Beaufort. See the *Bulletin of Duke University: Marine Laboratory* for the current schedule of courses.

FALL, SPRING, OR SUMMER PROGRAM AT BEAUFORT

For Juniors, Seniors, and Graduates

203. Physical Oceanography. Physical processes in the oceans: the physical properties of seawater, the dynamics of currents, waves and tides, and the transmission of light and sound in the sea. Prerequisite: Physics 41 or 51. C-L: Geology 203. 2 units. *Johnson*

203L. Marine Ecology. Application of ecological theory to marine systems. Emphasis on hypothesis formulation, field experimentation, data analysis, scientific writing, and familiarity with current ecological literature. Prerequisite: course in introductory ecology, invertebrate zoology, or marine botany (phycology); knowledge of statistics helpful. C-L: Zoology 203L. 6 units. *Hay (visiting summer faculty)*

209S. Marine Sediments. Sedimentary processes in nearshore, shelf, and deep-sea environments. Emphasis on field methods and laboratory analyses. Requirement of term paper. C-L: Geology 209S. 4 units. *Johnson*

209, 210. Independent Study. A tutorial designed for students who are interested in either a laboratory or a library project in biochemistry. C-L: Biochemistry 209, 210. Credit to be arranged. *Staff*

210. Individual Study. Directed reading and research in physiology. Prerequisite: consent of Director of Graduate Studies. C-L: Physiology 210. Credit to be arranged. *Staff*

213L. Behavioral Ecology. Investigating how ecological factors shape foraging, mating, aggressive, and social behavior. Laboratory experiments and field observations from the Outer Banks environment. Independent projects and seminars. Prerequisite: introductory biology. C-L: Zoology 213L. 4 units. *Rubenstein (visiting summer faculty)*

216L. Biology of Marine Macrophytes. Physiology and ecology of seaweeds, seagrasses, marshgrasses, and mangroves. Biological flux of carbon and nutrients in coastal seas. Ecological consequences of photosynthetic adaptations. Prerequisites: introductory biology and chemistry. C-L: Botany 216L. 4 units. *Ramus*

218. Barrier Island Ecology. Adaptation of plants to barrier island migration and other physical characteristics of the coastal environment. Major emphasis will be placed on management of barrier beaches from Maine to Texas and the impact of human interference with natural processes. Field studies. Prerequisite: course in general ecology. C-L: Botany 218 and Forestry and Environmental Studies 218. 6 units. *Evans, Peterson, and Wells*

250L. Physiology of Marine Animals. Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prerequisites: introductory biology and chemistry. C-L: Zoology 250L. 4 units. *Forward*

263L. Tropical Seaweeds. Collection, preservation, description, illustration, and descriptive ecology. Two-week field study. Prerequisite: Botany 145L or equivalent or consent of instructor. C-L: Botany 263L. 2 units. *Searles*

274L. Marine Invertebrate Zoology. Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips included. Not open to undergraduate students who have had Zoology 76L or 176L except by consent of Director of Undergraduate Studies. Prerequisite: introductory biology. C-L: Zoology 274L. 6 units. *Ruppert (visiting summer faculty)*

278L. Invertebrate Developmental Biology. Gametogenesis, fertilization, and development of invertebrates, with emphasis on experimental studies of prelarval stages. Prerequisite: consent of instructor. C-L: Zoology 278L. 6 units. *Staff*

295S. Advanced Topics in Geology: Continental Margin Sedimentation. Sediment composition and distribution on the continental margin, with emphasis on North Carolina barrier island/lagoon, shelf and slope environments. The course includes field work and laboratory analyses of sediments as well as readings and discussion of the current literature. Prerequisite: Geology 205S or Geology 206S or consent of instructor. C-L: Geology 295S. 4 units. *Johnson and Wells*

353, 354. Research. To be carried on under the direction of the appropriate staff members. (For graduate students only.) Hours and credit to be arranged. C-L: Zoology 353, 354. *Staff*

359, 360. Research. Individual investigation in the various fields of botany. C-L: Botany 359, 360. Credit to be arranged. *Staff*

371, 372. Advanced Topics in Geology. To meet the individual needs of graduate students for independent study in various environmental sedimentary fields. 1 to 3 units. *Staff*

Seminar. Special topics in the marine sciences. Exploration at the advanced level of current research in the marine sciences. Subject dependent on faculty and student interests. C-L: Biochemistry 265S, 266S; Botany 295S, 296S; and Zoology 295S, 296S. 2 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

204. Chemical Oceanography. (C-L: Geology 204.)

219L. Benthic Marine Algae. (C-L: Botany 219L.)

245L. Macromolecules, Ecology, and Evolution. (C-L: Biochemistry 245L.)

247L. Plant Ecology. (C-L: Botany 247L.)

266S. Marine Biochemistry and Genetics. (C-L: Biochemistry 266S.)

276. Comparative and Evolutionary Biochemistry. (C-L: Biochemistry 276.)

Mathematics

Professor Reed, *Chairman* (215 Physics); Associate Professor Venakides, *Director of Graduate Studies* (132C Physics); Professors Allard, Beale, Bryant, Griffiths, Schaeffer, Shoenfield, Warner, and Weisfeld; Associate Professors Burdick, Hodel, Kitchen, Kraines, Lawler, Moore, Morrison, Pardon, Scoville, and Smith; Assistant Professors Cheney, Gardner, Nance, Saper, Schoen, and Stern; Adjunct Professor Chandra; Visiting Professors Ramakrishnan and Ye; Visiting Associate Professor Shadwick; Visiting Assistant Professors Aktosun, DeLillo, Edelstein-Keshet, Kennedy, and Roy

Graduate work in the Department of Mathematics is offered leading to the A.M. and Ph.D. degrees. Admission to these programs is based on the applicant's undergraduate academic record, level of preparation for graduate study, the Graduate Record Examination, and letters of recommendation.

All A.M. and Ph.D. candidates are required to pass a qualifying examination after completing their first year of graduate study. The A.M. degree with a major in mathematics is awarded upon completion of 30 units of graded course work and passing the qualifying examination. A thesis may be substituted for 6 units of course work only under special circumstances.

Candidacy for the Ph.D. is established by passing the qualifying examination at the Ph.D. level, completing the department's foreign language requirement, and passing an oral preliminary examination. The preliminary examination is normally taken at the beginning of the third year. The preliminary examination is conducted by a committee selected by the rules of the Graduate School and the department. The examination can, at the student's option, consist of questions based either on the student's course work at Duke or on the specific area of research plus a minor subject selected by the student.

After admission to candidacy, the Ph.D. degree is awarded on the basis of the student's scholarly ability as demonstrated by the dissertation and its defense. The dissertation is the most important requirement in the award of the Ph.D. degree.

For Seniors and Graduates

200. Introduction to Algebraic Structures I. Laws of composition, groups, rings; isomorphism theorems; axiomatic treatment of natural numbers; polynomial rings; division and Euclidean algorithms. Prerequisite: Mathematics 104 or equivalent. 3 units. *Staff*

201. Introduction to Algebraic Structures II. Vector spaces, matrices and linear transformations, fields, extensions of fields, construction of real numbers. Prerequisite: Mathematics 200 or equivalent. 3 units. *Staff*

203. Basic Analysis I. Topology of R^n , continuous functions, uniform convergence, compactness, infinite series, theory of differentiation, and integration. Not open to students who have had Mathematics 139. Prerequisite: Mathematics 104. 3 units. *Staff*

204. Basic Analysis II. Inverse and implicit function theorems, differential forms, integrals on surfaces, Stokes' theorem. Not open to students who have had Mathematics 140. Prerequisite: Mathematics 203. 3 units. *Staff*

205. Topology. Elementary topology, surfaces, covering spaces, Euler characteristic, fundamental group, homology theory, exact sequences. Prerequisite: Mathematics 104. 3 units. *Staff*

206. Differential Geometry. Geometry of curves and surfaces, the Serret-Frenet frame of a space curve, the Gauss curvature, Codazzi-Mainardi equations, the Gauss-Bonnet formula. Prerequisite: Mathematics 104. 3 units. *Staff*

221, 222, 223. Numerical Analysis. See C-L: Computer Science 221, 222, and 223. 9 units. *Staff*

230. Mathematical Methods in Physics and Engineering I. Heat and wave equations, initial and boundary value problems, Fourier series, Fourier transforms, potential theory. Not open to students who have had Mathematics 114. Prerequisites: Mathematics 103 and 104 or equivalents. 3 units. *Staff*

231. Mathematical Methods in Physics and Engineering II. Green's functions, propagators, integral equations, spectral theory on Hilbert space, Fredholm alternative, variational methods. Prerequisite: Mathematics 114 or Mathematics 230. 3 units. *Staff*

233. Asymptotic and Perturbation Methods. Asymptotic solution of linear and non-linear ordinary and partial differential equations. Asymptotic evaluation of integrals. Singular perturbation. Boundary layer theory. Multiple scale analysis. Prerequisite: Mathematics 114 or equivalent. 3 units. *Staff*

234. Mathematics for Quantum Mechanics. Hilbert space, self-adjoint operators, the mathematical model of quantum mechanics, commutation relations, spectral analysis of Hamiltonians, time dependent scattering theory. Prerequisites: Mathematics 230 and 231 or equivalents. 3 units. *Staff*

235. Topics in Mathematical Physics. Group representations, perturbation theory, quantum field theory, statistical mechanics, or general relativity. Prerequisite: Mathematics 231 or equivalent. 3 units. *Staff*

238, 239. Topics in Applied Mathematics. Conceptual basis of applied mathematics, combinatorics, graph theory, game theory, mathematical programming, or numerical solution of ordinary and partial differential equations. Prerequisites: Mathematics 103 and 104 or equivalents. 6 units. *Staff*

240. Applied Stochastic Processes. Applications of probability theory and stochastic processes to economics and environmental science. Markoff chains, optional stopping, queuing theory, decision theory, birth and death processes, and the Monte Carlo method. Prerequisite: Mathematics 135 or equivalent. 3 units. *Staff*

241. Linear Models. Geometric interpretation, multiple regression, analysis of variance, experimental design, analysis of covariance. Prerequisite: Mathematics 136 or equivalent. 3 units. *Staff*

242. Multivariate Statistics. Multinormal distributions, multivariate general linear model, Hotelling's T^2 statistic, Roy union-intersection principle, principal components, canonical analysis, factor analysis. Prerequisite: Mathematics 241 or equivalent. 3 units. *Staff*

245. Functional Analysis for Scientific Computing. See C-L: Computer Science 245. 3 units. *Rose or Szylid*

250. Introductory Mathematical Logic. First-order logic, completeness theorem, compactness theorem, introduction to recursive functions, incompleteness theorem. Prerequisite: Mathematics 187 or Mathematics 200 or equivalent. 3 units. *Staff*

251. Set Theory I. Zermelo-Fraenkel axioms, ordinals and cardinals, models of set theory, constructible sets. Prerequisite: Mathematics 187 or Mathematics 200 or equivalent. 3 units. *Staff*

252. Set Theory II. Forcing, large cardinals, determinateness, and other advanced topics. Prerequisite: Mathematics 251. 3 units. *Staff*

253. Recursion Theory. Register and Turing machines; recursive functions and sets; recursively enumerable sets; arithmetical and analytic hierarchies; degrees; unsolvable problems; complexity theory. Prerequisite: Mathematics 187 or Mathematics 200 or equivalent. 3 units. *Staff*

258, 259. Topics in Logic. Model theory, recursion theory, set theory, or other fields of logic. Prerequisite: Mathematics 250 or equivalent. 6 units. *Staff*

260. Groups, Rings, and Fields. Groups including nilpotent and solvable groups, p -groups and Sylow theorems; rings and modules including classification of modules over a PID and applications to linear algebra; fields including extensions and Galois theory. Prerequisite: Mathematics 201 or equivalent. 3 units. *Staff*

261. Commutative Algebra. Extension and contraction of ideals, modules of fractions, primary decomposition, integral dependence, chain conditions, affine algebraic varieties, Dedekind domains, completions. Prerequisite: Mathematics 260 or equivalent. 3 units. *Staff*

268, 269. Topics in Algebra. Algebraic number theory, algebraic K -theory, homological algebra, or topological algebra. Prerequisite: Mathematics 260. 6 units. *Staff*

271. Algebraic Topology. Fundamental group and covering spaces, homology groups of cell complexes, classification of compact surfaces, the cohomology ring, and Poincaré duality for manifolds. Prerequisites: Mathematics 171S and 200 or equivalents. 3 units. *Staff*

273. Algebraic Geometry. Local theory: affine varieties, algebraic and topological theory of singularities. Global theory over the complex numbers: Riemann surfaces, Jacobians, Kähler manifolds, Hodge theory, theorems of Lefschetz and Kodaira. Prerequisite: Mathematics 261 or equivalent. 3 units. *Staff*

275. Differential Geometry. Differentiable manifolds, fiber bundles, connections, curvature, characteristic classes, Riemannian geometry including submanifolds and variations of the length integral, complex manifolds, homogeneous spaces. Prerequisites: Mathematics 204 and 260 or equivalents. 3 units. *Staff*

276. Topics in Differential Geometry. Lie groups and related topics, Hodge theory, index theory, minimal surfaces, Yang-Mills fields, exterior differential systems, several complex variables. Prerequisite: Mathematics 275 or consent of instructor. 3 units. *Staff*

277. Topics in Algebraic Geometry. Projective varieties and the theory of extremal rays, classification of surfaces and higher-dimensional varieties, variation of Hodge structure and moduli problems, schemes and arithmetic varieties, or other advanced topics. Prerequisite: Mathematics 273 or consent of instructor. 3 units. *Staff*

278, 279. Topics in Topology. Point set, algebraic, geometric, or differential topology. Prerequisite: consent of instructor. 6 units. *Staff*

280. Differential Analysis. Differential calculus, ordinary differential equations, flows, Lie bracket, total differential equations, first order partial differential equations, deRham theory. Prerequisite: Mathematics 140 or equivalent. 3 units. *Staff*

281. Real Analysis I. Measures, Lebesgue integral, L^p -spaces, Daniell integral, differentiation theory, product measures. Prerequisite: Mathematics 204 or equivalent. 3 units. *Staff*

282. Real Analysis II. Metric spaces, fixed point theorems, Baire category theorem, Banach spaces, fundamental theorems of functional analysis, Fourier transform. Prerequisite: Mathematics 281 or equivalent. 3 units. *Staff*

283. Linear Operators. Bounded and unbounded operators on Banach and Hilbert spaces, symmetric and self-adjoint operators, Banach algebras, spectral theorem, unitary groups, compact operators, Fredholm theory, accretive operators, semigroups of operators. Prerequisite: Mathematics 282 or equivalent. 3 units. *Staff*

284. Topics in Functional Analysis. Advanced spectral analysis, operator algebras, nonlinear functional analysis, or structure theory of Banach spaces. Prerequisite: Mathematics 282 or equivalent. 3 units. *Staff*

285. Complex Analysis. Complex calculus, conformal mapping, Riemann mapping theorem, Riemann surfaces. Prerequisite: Mathematics 140 or equivalent. 3 units. *Staff*

286. Topics in Complex Analysis. Geometric function theory, function algebras, several complex variables, uniformization, or analytic number theory. Prerequisite: Mathematics 285 or equivalent. 3 units. *Staff*

288, 289. Topics in Analysis. Harmonic analysis, dynamical systems, geometric measure theory, or calculus of variations. Prerequisites: Mathematics 281 and 285 or equivalents. 6 units. *Staff*

290. Probability. Random variables, independence, expectations, laws of large numbers, central limit theorem, Markoff chains. Prerequisite: Mathematics 281 or equivalent. 3 units. *Staff*

293, 294. Topics in Probability Theory. Ergodic theory, multiparameter stochastic processes and random fields, stochastic control theory, or stochastic differential equations. Prerequisite: Mathematics 290 or consent of instructor. 6 units. *Staff*

295. Fourier Analysis and Distribution Theory. Tempered distributions, Fourier transforms, classical inequalities, and oscillatory integrals. Prerequisites: Mathematics 204 and 285 or equivalents. 3 units. *Staff*

296. Ordinary Differential Equations. Existence and uniqueness theorems for nonlinear systems, well-posedness, two-point boundary value problems, phase plane diagrams, stability, dynamical systems, and strange attractors. Prerequisites: Mathematics 104, 111 or 131, and 203 or 139. 3 units. *Staff*

297. Partial Differential Equations I. Fundamental solutions of linear partial differential equations, hyperbolic equations, characteristics, Cauchy-Kowalevski theorem, propagation of singularities. Prerequisite: Mathematics 204 or equivalent. 3 units. *Staff*

298. Partial Differential Equations II. Elliptic boundary value problems, regularity theorems, the diffusion equation, and nonlinear equations. Prerequisite: Mathematics 297 or equivalent. 3 units. *Staff*

299. Topics in Partial Differential Equations. Hyperbolic conservation laws, pseudo-differential operators, variational inequalities, theoretical continuum mechanics. Prerequisite: 298 or equivalent. 3 units. *Staff*

378-379. Current Research in Topology. 6 units. *Staff*

388, 389. Current Research in Analysis. 6 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

358-359. Current Research in Logic

368-369. Current Research in Algebra

387. Current Research in Mathematical Physics

Program in Medieval and Renaissance Studies

Professor L. Patterson, *Chairman*

Professor Charles R. Young, *Director of Graduate Studies* (325 Allen)

The graduate Program in Medieval and Renaissance Studies is an interdisciplinary program administered by the Duke University Center for Medieval and Renaissance

Studies. In consultation with the Director of Graduate Studies, students in the program select courses in art, history, music, philosophy, religion, language, and literature (classical studies, English, German, and Romance languages). For descriptions of the individual courses see the listings under the specified department.

DEPARTMENT OF ART AND ART HISTORY

- 230S. Medieval and Byzantine Art and Architecture. *Bruzelius or Epstein*
- 232S. Romanesque and Gothic Art and Architecture. *Bruzelius*
- 240. Italian Art. *Goffen or Spencer*
- 242S. Studies in Italian Renaissance Art. *Goffen or Spencer*
- 243S. Studies in Northern Art. *Staff*

DEPARTMENT OF CLASSICAL STUDIES

- 221. Medieval Latin. *Newton*

DEPARTMENT OF ENGLISH

- 208. History of the English Language. *Butters or Nygard*
- 212. Middle English Literature: 1100 to 1500. *Fish, Gopen, Nygard, or L. Patterson*
- 221. Renaissance Prose and Poetry: 1500 to 1660. *DeNeef, Fish, A. Patterson, Randall, Schwartz, or G. Williams*
- 225. Renaissance Drama: 1500 to 1642. *Patterson, Randall, or G. Williams*
- 312. Studies in Middle English Literature. *Nygard or L. Patterson*
- 315. Studies in Chaucer. *Nygard or L. Patterson*
- 321. Studies in Renaissance Literature. *DeNeef, Fish, A. Patterson, Randall, or G. Williams*
- 324. Studies in Shakespeare. *A. Patterson, Porter, or G. Williams*
- 329. Studies in Milton. *DeNeef, Fish, or A. Patterson*
- 383. Textual Criticism. *G. Williams*

DEPARTMENT OF GERMANIC LANGUAGES AND LITERATURE

- 205, 206. Middle High German. *Staff*
- 215S. Seventeenth-Century Literature. *Borchardt*
- 216. History of the German Language. *Staff*
- 217S. Renaissance and Reformation Literature. *Borchardt*

DEPARTMENT OF HISTORY

- 207. Constitutional History of Britain: The Rise of the Common Law. *Herrup*
- 222. Problems in the Intellectual History of the European Renaissance and Reformation. *Witt*
- 237S. Europe in the Early Middle Ages. *Young*
- 238S. Europe in the High Middle Ages. *Young*
- 267S-268S. From Medieval to Early Modern England. *Herrup*

DEPARTMENT OF MUSIC

- 201. Introduction to Musicology. *Druesedow or Seebass*
- 211, 212. Notation. *Williams*
- 222. Music in the Middle Ages. *Staff*
- 223. Music in the Renaissance. *Staff*
- 312S. Seminar in Renaissance Music. *Staff*
- 341S. History of Music Theory to Rameau. *Silbiger*
- 351S. Studies in Musical Iconography. *Seebass*

DEPARTMENT OF PHILOSOPHY

- 218S. Medieval Philosophy. *Mahoney*
- 219S. Late Medieval and Renaissance Philosophy. *Mahoney*

DEPARTMENT OF RELIGION

- 219. Augustine. *Staff*
- 236. Luther and the Reformation in Germany. *Steinmetz*
- 241. Problems in Reformation Theology. *Steinmetz*
- 334. Theology and Reform in the Later Middle Ages. *Steinmetz*
- 337. Theology of St. Thomas Aquinas. *Staff*
- 338. Calvin and the Reformed Tradition. *Steinmetz*
- 339. The Radical Reformation. *Steinmetz*

DEPARTMENT OF ROMANCE LANGUAGES

French

- 211. History of the French Language. *Hull*
- 248. French Literature of the Seventeenth Century. *Staff*
- 325. French Prose of the Sixteenth Century. *Tétel*
- 326. Topics in Renaissance Poetry. *Tétel*
- 391, 392. French Seminar (medieval and Renaissance topics). *Tétel and staff*

Italian

- 284, 285. Dante. *Caserta*

Spanish

- 210. History of the Spanish Language. *Garci-Gómez*
- 251. The Origins of Spanish Prose Fiction. *Wardropper*
- 253. Cervantes. *Wardropper*
- 254. Drama of the Golden Age. *Wardropper*
- 258S. Spanish Lyric Poetry before 1700. *Wardropper*
- 391, 392. Hispanic Seminar (medieval and Renaissance topics). *Fein, Garci-Gómez, Osuna, Pérez Firmat, and Wardropper*

COURSES CURRENTLY UNSCHEDULED

- Classical Studies 327. Seminar in Byzantine History
- English 210. Old English Literary Tradition
- English 310. Studies in Old English Literature
- English 380. Studies in Ballad and Folksong
- Music 311S. Seminar in Medieval Music
- Religion 206. Christian Mysticism in the Middle Ages
- Religion 251. The Counter-Reformation and the Development of Catholic Dogma
- Religion 344. Zwingli and the Origins of Reformed Theology

Microbiology and Immunology

Professor Joklik, *Chairman* (414A Jones); Professor Willett, *Director of Graduate Studies* (420 Jones); Professors Amos, Bastia, Bolognesi, R. Buckley, Cresswell, Metzgar, Nevins, Osterhout, Rosse, Seigler, Ward, and Wheat; Associate Professors Adams, Corley, Dawson, Endow, Greene, Haynes, Keene, Linney, McClay, Mitchell, Ruderman, and Sage; Assistant Professors Argon, C. E. Buckley, Finn, Kreuzer, Ostrowski, Pickup, and Pisetsky; Associate Medical Research Professors Balber and Miller; Assistant Medical Research Professors Burdett and Singer

The department offers graduate work leading to the Ph.D. degree. Research programs are available in many areas of molecular prokaryotic and eukaryotic genetics and cell biology—molecular viology, viral oncology, cellular differentiation and development, tumor cell biology, immunogenetics, molecular and cellular immunology, and mycology. The department is also a participating member of the interdisciplinary University Programs in Genetics, Cell and Molecular Biology, and the Medical Sciences Training Program.

Undergraduate preparation in the biological and physical sciences and in biochemistry is required. A brochure describing the Ph.D. degree program, prerequisites for admission, and research in the department may be obtained by writing the Director of Graduate Studies, Box 3020, Duke University Medical Center, Durham, North Carolina 27710.

214. Fundamentals of Electron Microscopy. Introduction to the basics of transmission electron microscopy. Specimen preparation techniques include: grid preparation, negative staining, metal shadowing, nucleic acid spreading, embedding, and thin sectioning. Students gain experience in the use of the ultramicrotome and electron microscope by working on their own projects. Additional techniques included are ultracryotomy immunoelectron microscopy, freeze-fracture, scanning electron microscopy, and x-ray spectroscopy. 3 units. *Miller*

219. Molecular and Cellular Bases of Differentiation. See C-L: Anatomy 219; also C-L: Biochemistry 219, Pathology 219, and Physiology 230. *Counce, McCarty, and staff*

221. Medical Microbiology. An intensive study of common bacteria, viruses, fungi, and parasites which cause disease in humans. The didactic portion of the course focuses on the nature and biological properties of microorganisms causing disease, the manner of their multiplication, and their interaction with the entire host as well as specific organs and cells. 4 units. *Joklik and staff*

244. Principles of Immunology. An introduction to the molecular and cellular basis of the immune response. Topics include anatomy of the lymphoid system, lymphocyte biology, antigen-antibody interactions, humoral and cellular effector mechanisms, and control of immune responses. Prerequisites: Zoology 160 and Chemistry 152 and consent of instructor. C-L: Zoology 244. 3 units. *Amos, McClay, and staff*

246S. Parasitic Diseases. Topics in the physiology and immunology of major human and animal parasites with an emphasis on protozoa and schistosomes. Extensive reading in and discussion of current literature. Basic parasitology developed in introductory readings and lectures. Prerequisites: Microbiology and Immunology 244 or 291, and Biochemistry 227 or equivalent. 3 units. *Balber*

252. General Virology and Viral Oncology. The first half of the course will be devoted to a discussion of the structure and replication of mammalian and bacterial viruses. The second half deals specifically with tumor viruses, which are discussed in terms of the virus-cell interaction, the relationship of virus infection to neoplasia, and the role of the immunological response to tumor virus infection. Prerequisite: consent of instructor. 4 units. *Keene and staff*

259. Molecular Biology I: Protein and Membrane Structure/Function. See C-L: The University Program in Cell and Molecular Biology; also C-L: Anatomy 259 and Biochemistry 259. 3 units. *Richardson and staff*

268. Molecular Biology II: Nucleic Acids. C-L: Biochemistry 268, Botany 268, and the University Program in Cell and Molecular Biology. 4 units. *Modrich and staff*

269. Advanced Cell Biology. See C-L: The University Program in Cell and Molecular Biology; also C-L: Anatomy 269, Botany 269, and Zoology 269. 3 units. *Endow and staff*

291. Comprehensive Immunology. An intensive course in the biology of the immune system and the structure and function of its component parts. Major topics discussed are: properties of antigens; specificity of antibody molecules and their biologic functions; cells and organs of the lymphoid system; structure and function of complement; inflammation and nonspecific effector mechanisms; cellular interactions and soluble mediators in lymphocyte activation, replication, and differentiation; regulation of immune responses; neoplasia and the immune system; molecular structure and genetic organization of (a) immunoglobulins, (b) histocompatibility antigens, and (c) T-cell receptor. 4 units. *Argon, Finn, and staff*

For Graduates

304. Molecular Membrane Biology. An advanced seminar course covering selected aspects of current research on biogenesis and dynamics of various cellular membranes. Emphasis will be on the cell biology of the immune system. Discussion topics will represent the following areas: biosynthesis of membrane proteins; intracellular transport vesicles; endocytosis; signal transduction across the plasma membrane; intracellular organelles and protein sorting; cell interactions in differentiation. Prerequisite: Microbiology 269 or consent of instructor. 2 units. *Argon and Cresswell*

310. Molecular Development. Selected topics of current research using molecular and genetic approaches to study development and developmental gene regulation in eukaryotes. Lectures and student presentations of research with various developmental systems (e.g., *C. elegans*, *Drosophila*, mouse teratocarcinoma cells, and mouse embryos) will be included in the course. 2 units. *Bastia, Endow, and Linney*

324. Topics in Molecular Genetics. An advanced treatment of selected topics and recent developments in molecular genetics. 2 units. *Staff*

325. Medical Mycology. Comprehensive lecture and laboratory coverage of all the fungi pathogenic for humans. Practical aspects as well as future trends in the mycology, immunology, diagnosis, pathogenesis, and epidemiology of each mycotic agent will be explored. There will be several invited lecturers, each an internationally recognized scientist, discussing his or her particular area of mycological expertise and current research. Prerequisite: consent of instructor. 4 units. *Mitchell*

330. Medical Immunology. A comprehensive course in medical immunology which attempts to define the role that immunology plays in the etiology, diagnosis, nosology, and therapy of human disease. 6 units. *Ward and staff*

331.1-331.8. Microbiology Seminar. Current topics in microbiology with seminars presented by students, faculty, and outside speakers. Required course for all students specializing in microbiology. 1 unit each. *Staff*

332.1-332.8. Immunology Seminar. Current topics in immunology with seminars presented by students, faculty, and outside speakers. Required course for all students specializing in immunology. 1 unit each. *Staff*

336. Contemporary Topics in Immunogenetics. Selected themes in immunogenetics with special emphasis on molecular approaches. The major areas discussed are: the nature, interaction, and expression of immunoglobulin genes and T-cell receptor genes, the genes of the major histocompatibility complex, and the genes of the T/t complex. The central ideas discussed include the manner in which cells recognize and interact with each other in phylogeny, ontogeny, and in differentiation; how gene families evolve and interact; and how information about these complex genetic systems is used in basic research and in clinical medicine. Prerequisite: Microbiology and Immunology 244 or 291 or 330 or equivalent. C-L: The University Program in Genetics. 2 units. *Amos and Ward*

COURSES CURRENTLY UNSCHEDULED

234. Introduction to Biostatistical Methods

236. Statistical Methods in Human Genetics

282. Molecular Microbiology

323. Topics in Cell and Molecular Biology

Music

Professor Williams, *Chairman* (105 Mary Duke Biddle Music Building); Professor Silbiger, *Director of Graduate Studies* (067 Mary Duke Biddle Music Building); Associate Professors Seebass and Todd; Assistant Professors Bartlet, Gilliam, Higgins, Hill, and Jaffe; Adjunct Assistant Professor Druesedow, *Director of Music Library*

The Department of Music offers graduate programs leading to the A.M. and Ph.D. degrees in musicology, the A.M. degree in composition, and the A.M. degree in performance practice. The department has traditionally emphasized the study of music within the framework of cultural and intellectual history. To this has been added more recently emphases on theory and analysis, and on performance practice. In addition, there is a

strong interest, within both the composition and musicology programs, in opera and musical theater. Students are encouraged to include work outside their main area of concentration in their degree programs.

Nondegree students and especially graduate students from other departments may be admitted to graduate courses by consent of the instructor, according to their level of achievement in the proposed area of study. Students may be admitted to the Program in Medieval and Renaissance Studies (see section on Medieval and Renaissance Studies). A reading knowledge of one foreign language is required for the A.M. in composition, musicology, and performance practice; two languages are required for the Ph.D. (one of which will normally need to be German). For many dissertation topics a third language may be required.

A detailed description of the requirements for the A.M. and Ph.D. is available upon request from the Director of Graduate Studies.

201. Introduction to Musicology. Methods of research on music and its history, including studies of musical and literary sources, iconography, performance practice, ethnomusicology, and historical analysis, with special attention to the interrelationships of these approaches. 3 units. *Druesedow or Seebass*

211, 212. Notation. A comprehensive course tracing the development and changing function of musical notation from *ca.* 900 to *ca.* 1900, including plainchant notations, black notations, white notations, the invention of printing (particularly movable type and engraving), keyboard and lute tablatures, scores. 6 units. *Higgins or Williams*

213. Theories and Notation of Contemporary Music. The diverse languages of contemporary music and their roots in the early twentieth century, with emphasis on the problems and continuity of musical language. Recent composers and their stylistic progenitors (e.g., Ligeti, Bartók, and Berg; Carter, Schoenberg, Ives and Copland; Crumb, Messiaen, and Webern; Cage, Varèse, Cowell and Stockhausen). 3 units. *Jaffe*

215. Music Analysis. Introduction to the historical, philosophical, and ideological issues raised by music analysis. Intensive study of harmony and voice leading in the works of major tonal composers, with emphasis on the analytic approach of Heinrich Schenker. 3 units. *Hill or Todd*

216. Analysis of Twentieth-Century Music. Major currents in twentieth-century analytical thought: Allen Forte's Theory of Sets and Milton Babbitt's Twelve-Tone Theory. Some exploration of issues raised by neotonal composers Bartók and Stravinsky. 3 units each. *Jaffe*

Courses dealing with selected topics in the period concerned, at a level between simple surveys and advanced seminars:

222. Music in the Middle Ages. 3 units. *Staff*

223. Music in the Renaissance. 3 units. *Staff*

224. Music in the Baroque Era. 3 units. *Staff*

225. Music in the Classic Era. 3 units. *Staff*

226. Music in the Nineteenth Century. 3 units. *Staff*

227. Music in the Twentieth Century. 3 units. *Staff*

296S. Analysis of Contemporary Music. Structures, expressive intentions, and functions since 1914. Contemporary orchestral music, American music, European music, popular media, musical tradition, and the contemporary composers. Analysis of works performed in the department's Encounters Series with occasional guest composers present. 3 units. *Jaffe*

297, 298, 299. Composition. The culmination of graduate work in composition leading to the A.M. degree is the candidate's portfolio of original work, to include one major work of at least fifteen minutes in duration and a shorter work. One of these works should be for orchestra and the other for chamber ensemble. A one-act opera may qualify as the larger work. The portfolio should also include shorter works for diverse media to demonstrate the candidate's overall craftsmanship. Students will have weekly independent study sessions with a member of the graduate composition faculty who will supervise the preparation of his or her portfolio. 3 units. *Jaffe*

317S. Seminar in the History of Music. Selected topics. 3 units. *Staff*

318S. Seminar in Performance Practice. A practical seminar in which participants will be expected to perform, to introduce the work to be played or sung, and to outline its interpretative problems. A list of the music concerned will be posted in advance, and all students will participate in the study (if not necessarily in the performance) of the works announced. It is expected that the seminar will cover most periods, from Gregorian chant to twentieth-century repertoires. Prerequisite: consent of the instructor. 3 units. *Williams*

331, 332, 333. Independent Study in Performance Practice and Interpretation. The exploration of significant interpretive and performance-practice issues as they affect a specific repertory. Weekly meetings with a member of the graduate faculty. Prerequisites: consent of instructor and Director of Graduate Studies. 3 units. *Staff*

341S. History of Music Theory to Rameau. A study of writings on pitch systems (including monochord divisions and hexachord solmization), tonal relationships (including counterpoint and modal theories), and the organization of time (including mensural systems and proportions); implications for performance practice (e.g., intonation and temperaments, rhythm and tempo, *musica ficta*) and for the analysis of music from before 1700. 3 units. *Silbiger*

351S. Studies in Musical Iconography. The history and current trends in musical iconography; iconography as a part of the history of ideas and as *Realienforschung*, "the study of real objects." Discussion of papers in the area of interest of participants. 3 units. *Seebass*

361S. Musical Organology. Musical instruments in Western and non-Western music. Classification and organological literature. The primary function of instruments: their construction, their sound, and their impact on performance practice and the musical score. The secondary function of instruments: their social importance, their aesthetic and scientific value, their religious symbolism. Iconography of instruments. 3 units. *Seebass or Williams*

382S. Studies in Ethnomusicology. Ethnomusicology as a branch of musicology. Discussion of papers in African or Southeast Asian music and in the areas of interest of the participants. 3 units. *Seebass*

390. Independent Study. With the consent of a graduate faculty member and the approval of the Director of Graduate Studies, the student will undertake a specialized research project of his/her own choosing. 3 units. *Staff*

The University Program in Neurobiology

Professor Diamond, *Director* (psychology); Professors Erickson (psychology), Graham (pathology), Hall (anatomy), and Somjen (physiology); Associate Professors Kaufman (biochemistry) and Nadler (pharmacology)

Recent advances in neurobiology have resulted in new methods, such as immunohistochemistry, and in closer ties among the various approaches to studying the nervous system. For example, research on the neuroanatomical basis of behavior is more dependent than ever before on the chemical and cellular study of neurons. To keep pace with these changes the program in neurobiology has been designed for a small number of students who wish to study the nervous system at several levels, ranging from the molecular to the behavioral. In planning course work, each student will be guided by an advisory committee whose members come from a variety of departments. All students will be advised to take courses in neuroanatomy, neurophysiology, neuropharmacology, and neuropsychology. The heart of the training is a research apprenticeship that leads to a Ph.D. dissertation. Each student must affiliate with one of the participating departments—anatomy, biochemistry, microbiology and immunology, pathology, pharmacology, physiology, psychology, and zoology—and must meet all the requirements of that department for the Ph.D. degree. Normally, the dissertation adviser and the student will be members of the same department. A complete list of faculty, including research interests, will be made available to prospective students. *See course listings under the participating departments.*

Pathology

Professor Jennings, *Chairman* (301B Davison); Professor D. Bigner, *Director of Graduate Studies* (207 Jones); Professors Adams, S. Bigner, Bossen, Bradford, Burger, Fetter, Graham, Hackel, Johnston, Klintworth, Koepke, Michalopoulos, Pizzo, Pratt, Shelburne, Sommer, Vogel, and Wittels; Associate Professors Elchlepp, Ideker, McCarty, Reimer, Sanfilippo, and Zwadyk; Assistant Professors Abernethy, Crapo, Jirtle, Schold, and Zalutsky; Adjunct Associate Professor Swenberg; Adjunct Assistant Professor Brody; Associate Medical Research Professor Wikstrand; Assistant Clinical Professor Vollmer

The Department of Pathology offers graduate work leading to the M.S. and Ph.D. degrees with areas of specialization such as subcellular and molecular pathology. Course work is designed to give a broad background in classical and modern pathology with emphasis on the application of modern research techniques. Students will be required to take such courses as are necessary to obtain a broad foundation, as well as courses applicable to areas of speciality and research. Further information including brochures giving details of departmental facilities, staff, trainee stipends, and the M.D.-Ph.D. program are available from the Director of Graduate Studies.

219. Molecular and Cellular Bases of Differentiation. See C-L: Anatomy 219; also C-L: Biochemistry 219, Microbiology and Immunology 219, and Physiology 230. 3 units. *Padilla and staff*

250. General Pathology. The fundamentals of pathology are presented to the student. Lectures developing broad concepts of disease processes are given by the members of the senior staff. The emphasis is placed on etiology and pathogenesis of disease. Lectures. Prerequisites: histology and consent of instructor. 4 units. *Hackel or staff*

251. Laboratory Course in General Pathology. Laboratory session to complement Pathology 250. Gross and microscopic material is correlated with and related to disease processes. Pathology 250 may be taken concurrently. Prerequisites: histology and consent of instructor. 4 units. *Hackel or staff*

258. Cellular and Subcellular Pathology. This course is designed for students wishing to broaden their knowledge of cellular structure and cellular pathology. The course consists of lectures and seminars discussing the alterations in cellular structure and associated functions that accompany cell injury. Prerequisite: consent of instructor. Hours to be arranged. 2 units. *Shelburne and Sommer*

275. Fundamentals of Electron Microscopy and Biological Microanalysis. Emphasis will be placed on preparative procedures including freezing techniques and on the application of electron microscopy to ultrastructural pathology. Scanning electron microscopy, X-ray microanalysis, and scanning ion microscopy will be discussed in addition to conventional transmission electron microscopy. Limited laboratory experience included. 3 units. *Brody, Ingram, Shelburne, and Sommer*

325. Cardiovascular Pathology. Cardiovascular disease processes will be studied, reviewing anatomic, embryologic, and physiologic features, and utilizing case material and gross specimens. Consideration will be given to principles of electrocardiography. Prerequisite: consent of instructor. 3 units. *Hackel*

350. Neurobiology of Diseases. Prerequisites: Anatomy 305, 307, and Physiology 200, 202, or equivalents. See C-L: Physiology 350; also C-L: Pharmacology 350. Fall. 2 or 3 units. *Somjen and staff*

353. Advanced Neuropathology. This course deals with current problems and research methods related to diseases which affect the nervous system. Prerequisite: consent of instructor. 3 units. *Vogel*

355. Graduate Seminar in Pathology. Discussions outlining the scope of modern pathology. This will include reports of original researchers by members of staff and visitors. 1 unit. *Bigner and staff*

357. Research in Pathology. Independent research projects in various fields of pathology. Hours and credit to be arranged. *Jennings and staff*

361, 362. Autopsy Pathology. A detailed consideration of the morphologic, physiologic, and biochemical manifestations of disease. Emphasis is on individual work in the laboratory with tutorial supervision. Gross dissection; histologic examination; processing; analyzing of morphologic, microbiologic, and biochemical data; and interpretation of results. For advanced students. Prerequisites: Pathology 250 and consent of instructor. 3 to 6 units each. *Adams and staff*

364. Systemic Pathology. Systematic presentation of the characteristics of disease processes as they affect specific organ systems. Prerequisite: consent of instructor. 6 units. *Hackel and staff*

367. Special Topics in Pathology. Special problems in pathology will be studied with a member of the senior staff; the subject matter will be individually arranged. Hours to be arranged. 2 to 4 units. *Jennings and staff*

369. Ophthalmic Pathology. This course will consist of lectures, seminars, and laboratory sessions. The normal anatomy and embryology of the eye will be reviewed as a basis for the study of the various ocular disease processes. The more common diseases of the eye will be considered in detail. Problems in ophthalmic pathology will be discussed together with methods of solving them. 3 units. *Klintworth*

370. Developmental Pathology and Teratology. A systematic study of disease processes involving the prenatal, natal, and postnatal period. Emphasis will be placed on developmental anatomy and teratogenesis. The format includes seminars and clinicopathologic correlations derived from gross and microscopic material. Prerequisites: Pathology 250 and anatomy and histology. 3 units. *Bradford*

374. Pulmonary Pathology and Postmortem Pathophysiology. Emphasis will be on pulmonary pathology and pathophysiology of infectious, metabolic, environmental, and neoplastic diseases, and certain diseases of unknown etiology (e.g., sarcoid, alveolar proteinosis). Ventilatory experiments will be done on excised human lungs. 3 units. *Pratt*

377. Pathology of the Kidney. The course includes a comprehensive study of pathological, immunological, and clinical features of glomerulonephritis, and pyelonephritis, as well as of metabolic, congenital, and neoplastic renal disorders. Lectures will be supplemented with gross and microscopic specimens, demonstrations, and special library studies. 3 units. *Sanfilippo*

380. Diagnostic Immunology. Diagnostic and laboratory procedures used in evaluating immunologic diseases: especially autoimmune, infectious, immunodeficiency, immunoproliferative, and hypersensitivity disorders. Emphasis is placed on the theoretical and practical aspects of testing procedures and their proper interpretation. Prerequisite: permission of instructor. 2 units. *R. Buckley, Sanfilippo, and Zwadyk*

381. Cancer Biology. Emphasis of the course will be on cellular biology of the cancer cell. The instructors will present topics on aspects of cancer research and will attempt to correlate them with the biologic and clinical behavior of specific forms of neoplasia. 2 units. *Falletta and Michalopoulos*

382. General Pathology for Toxicologists. General principles of pathology using examples from human and experimental toxicological disease. Prerequisites: courses in biochemistry, physiology, and histology (histology may be taken concurrently). 3 units. *Graham, Jennings, and pathologists from UNC and Research Triangle Park*

COURSES CURRENTLY UNSCHEDULED

360. Cytochemistry

Pharmacology

Professor Kirshner, *Chairman* (439 Nanaline H. Duke); Professor Mills, *Director of Graduate Studies* (432 Nanaline H. Duke); Professors Abou-Donia, Ellinwood, Lack, Menzel, Ottolenghi, Rosen, Schanberg, Slotkin, Strauss, Watkins, and Wilder; Associate Professors Davis, Kuhn, McNamara, Nadler, Nemeroff, Niedel, and Whorton; Assistant Professors Kilts, Schwartz, and Strom; Professor Emeritus Bernheim; Medical Research Professor Elion; Associate Medical Research Professor Wilson; Assistant Medical Research Professors Bartolome, Bell, Lapadula, Seidler, and Wolpert

The Department of Pharmacology offers a graduate program which leads to the Ph.D. degree. Training is available in the areas of behavioral, biochemical, cardiovascular, developmental and endocrine pharmacology, neuropharmacology, and toxicology. Because pharmacology is an interdisciplinary field, the department gives serious consideration to applicants with strong undergraduate backgrounds in biological, chemical, and neural or behavioral sciences. There is no foreign language requirement.

For Seniors and Graduates

200. Pharmacology: Mode Action of Drugs. Studies and discussion of the pharmacological action of drugs in terms of biochemical and physiological processes. Four lectures, one clinical correlation, and two conferences per week. 5 units. *Staff*

210, 211. Individual Study and Research. Directed reading and research in pharmacology. Prerequisite: consent of Director of Graduate Studies. 3 to 9 units each. *Staff*

219. Tutorial in Pharmacology. Guided independent study of original literature. Credit to be arranged. *Staff*

280. Student Seminar in Pharmacology. Preparation and presentation of seminars to students and faculty on topics of broad interest to pharmacology. Required of all pharmacology graduate students. 2 units. *Whorton*

For Graduates

314. Integrated Case Studies in Toxicology. Students are assigned topics relative to their chosen research discipline in toxicology and are asked to develop case studies to present at a roundtable workshop. Emphasis on review and analysis of toxicological problems from a holistic (multidisciplinary) viewpoint. C-L: Forestry and Environmental Studies 314. Spring. 1 unit. *Abou-Donia*

331. Laboratory Methods in Pharmacology. Tutorial laboratory training in various fields of pharmacology including neuropharmacology, cardiovascular pharmacology, biochemical pharmacology, and biophysical pharmacology. Prerequisite: consent of instructor. 3 to 6 units. *Staff*

333. Principles of Pharmacology and Toxicology I. Drug absorption, distribution, excretion and metabolism, pharmacokinetics, Hansch correlation of structure and activity, stereochemistry, and drug action. May be taken separately from Pharmacology 334. 4 units. *Slotkin and staff*

334. Principles of Pharmacology and Toxicology II. Drug and hormone receptors and target cell responses, cellular actions of drugs and toxic substances, mechanisms of toxicity and antidoting, adverse drug reactions and interactions, behavioral techniques in pharmacology. Prerequisite: Pharmacology 333 or permission of instructor. 4 units. *Rosen, Slotkin, and staff*

347, 348. Seminar in Toxicology. See C-L: Biochemistry 347, 348. 1 unit per semester. *Abou-Donia and Lynn*

350. Neurobiology of Diseases. Prerequisites: Anatomy 305, 307, and Physiology 200, 202, or equivalents. See C-L: Physiology 350; also C-L: Pathology 350. Fall. 2 or 3 units. *Somjen and staff*

354. Mammalian Toxicology. Principles of toxicology as related to humans. Emphasis on the molecular basis for toxicity of chemical and physical agents. Subjects include metabolism and toxicokinetics, toxicologic evaluation, pesticides, metals and industrial chemicals, solvent toxicity, food additives, natural toxins, radiation and radioactive materials; mutagenicity, pathology, carcinogenicity, immunology, teratogenicity; reproductive system, pulmonary, liver, kidney, eye, blood, behavioral cardio- and neurotoxicology; management of poisoning, epidemiology, risk assessment and regulatory toxicology. Taught in alternate years in the spring semester. 4 units. *Abou-Donia and staff*

360. Neuropharmacology. Seminar-lecture course emphasizing neurotransmitter mechanisms and the mechanisms of action of drugs used to modify nervous system function. Material will be drawn from recent literature. Prerequisite: Physiology 270 or consent of instructor. 3 units. *Nadler*

364. Neurotoxicology. Adverse effects of drugs and toxicants on the central and peripheral nervous system; target sites and pathophysiology aspects of neurotoxicity; factors affecting neurotoxicity, screening and assessment of neurotoxicity in humans; experimental methodology for detection and screening of chemicals for neurotoxicity. 3 units. *Abou-Donia and staff*

370. Neurobiology I. Interdisciplinary approach to neuronal function at the cellular and molecular levels. Focus is on the anatomy, biophysics, biochemistry, and pharmacology of conductance and transmission of the neuronal impulse. C-L: Anatomy 370 and Physiology 370. 3 units. *Kirshner and staff*

372. Research in Pharmacology. Laboratory investigation in various areas of pharmacology. Credit to be arranged. *Staff*

417. Cellular Endocrinology. Current concepts of the mechanisms of action of hormones at the cellular level, including hormone-receptor interactions, secondary messenger systems for hormones, mechanisms of regulation of hormone responsiveness, regulation of growth, differentiation, and proliferation, cellular and electrophysiological mechanisms of secretory stimulus sensing and transduction, systems approach to feedback regulation and information transfer in an endocrine system. Lectures by local and outside clinical faculty will stress the clinical correlation of the basic concepts elaborated in the course. Students will be expected to participate in one seminar presentation. C-L: Physiology 417. 2 units. *N. Anderson, Caron, Padilla, and guest faculties*

423. Neurobiological Basis of Behavior. The course surveys neuroanatomical, neurophysiological, neurochemical, and neuropharmacological evidence of central nervous system function as it relates to normal and abnormal behavior. Clinical description, measurement of function, as well as the biological substrates of affective disorders and psychoses will be emphasized. Scientific bases of current therapeutic procedures, especially psychopharmacological, will be examined. Prerequisite: Familiarity with basic neuroanatomy, neurophysiology, and neuropharmacology is assumed. 4 units. *Ellinwood and staff*

COURSES CURRENTLY UNSCHEDULED

256. Human Nutrition

301. Physical Chemistry of Aqueous Solutions

Philosophy

Professor Sanford, *Chairman* (201D West Duke); Associate Professor Brandon, *Director of Graduate Studies* (201C West Duke); Professors Golding, Mahoney, and Peach; Associate Professor Posy; Assistant Professors Ferejohn and Roderick; Professor Emeritus Welsh

The Department of Philosophy offers graduate work leading to the A.M. and Ph.D. degrees. Tutorial work complements formal instruction. Students may, after taking a balanced program, specialize in any of the following fields: the history of philosophy, logic, philosophy of science, epistemology, metaphysics, philosophy of mind, philosophical analysis, ethics, aesthetics, political philosophy, philosophy of law, philosophy of medicine, and philosophy of religion.

Individual programs of study are developed for each student. Prior to being admitted to candidacy for the Ph.D. degree, the student must demonstrate a competence in one foreign language and must successfully complete a series of essays and examinations covering the following: logic and formal philosophy; value theory; metaphysics, epistemology, and philosophy of science; and the history of philosophy. In these exercises students are expected to combine factual knowledge with critical understanding.

Work in a minor or related field, not necessarily confined to any one department, is encouraged but not required. A minor normally includes 6 units for the A.M. or the Ph.D. degree and may include more as a student's program requires or permits.

A student who meets the general requirements of the Graduate School may earn the A.M. degree in philosophy by passing an oral master's examination. This examination, which can be the defense of either a master's thesis or an alternative academic exercise approved by the department and the student's committee, is normally given in the student's fourth term of full-time registration. The examination can be given earlier in two special circumstances:

1. A student with a strong undergraduate background in philosophy who satisfies the department of his or her qualifications by submitting several samples of written work before beginning the program may be admitted to the master's program with the understanding that the master's examination can be given in the second or third term of full-time registration.

2. A student who combines the A.M. program in philosophy with another advanced degree program, such as the programs for the J.D., the M.D., or the Ph.D. in another field, will register as a full-time graduate student of philosophy for only two terms, the minimum registration that meets the general requirements of the Graduate School for the A.M. degree. These two terms of full-time registration need not be consecutive, and their position in the student's overall program is determined in individual cases. A student in a combined program will normally do some work in philosophy while registered in the student's primary program and do some work in the primary field while registered in philosophy. The master's examination can be given in the second term of full-time registration as a philosophy graduate student or in a later term when the student is registered in the primary program.

A student in the philosophy Ph.D. program who meets the general requirements of the Graduate School for the A.M. degree may earn this degree by completing the preliminary exercises for the Ph.D. degree.

A reading knowledge of at least one foreign language, ancient or modern, is required for the Ph.D. degree. Students must satisfy this requirement by the end of the fifth semester of residency. More than one language may be required where this is judged appropriate to the research demanded by the candidate's dissertation.

For Seniors and Graduates

203S. Contemporary Ethical Theories. The nature and justification of basic ethical concepts in the light of the chief ethical theories of twentieth-century British and American philosophers. 3 units. *Golding*

204S. Philosophy of Law. Natural law theory and positivism, the idea of obligation (legal, political, social, moral), and the relation of law and morality. 3 units. *Golding*

205S. Topics in Philosophy of History. Nature of historical knowledge and inquiry; theories of the historical process. 3 units. *Staff*

206S. Responsibility. The relationship between responsibility in the law and moral blameworthiness; excuses and defenses; the roles of such concepts as act, intention, motive, ignorance, and causation. 3 units. *Golding*

208S. Political Values. Analysis of the systematic justification of political principles and the political values in the administration of law. 3 units. *Golding*

211S. Plato. Selected dialogues. C-L: Classical Studies 211S. 3 units. *Ferejohn*

217S. Aristotle. Selected topics. C-L: Classical Studies 217S. 3 units. *Ferejohn*

218S. Medieval Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. 3 units. *Mahoney*

219S. Late Medieval and Renaissance Philosophy. Selected problems. C-L: Medieval and Renaissance Studies. 3 units. *Mahoney*

225S. British Empiricism. A critical study of the writings of Locke, Berkeley, or Hume with special emphasis on problems in the theory of knowledge. 3 units. *Peach*

227S. Continental Rationalism. A critical study of the writings of Descartes, Spinoza, or Leibniz with special emphasis on problems in the theory of knowledge and metaphysics. 3 units. *Peach*

228S. Recent and Contemporary Philosophy. A critical study of some contemporary movements, with special emphasis on analytic philosophers. 3 units. *Posy*

231S. Kant's Critique of Pure Reason. 3 units. *Posy*

233S. Methodology of the Empirical Sciences. Recent philosophical discussion of the concept of a scientific explanation, the nature of laws, theory and observation, probability and induction, and other topics. Prerequisite: consent of instructor. 3 units. *Brandon*

234S. Problems in the Philosophy of Biology. Selected topics, with emphasis on evolutionary biology: the structure of evolutionary theory, adaptation, teleological or teleonomic explanations in biology, reductionism and organicism, the units of selection and sociobiology. Prerequisite: consent of instructor. C-L: Botany 234S and Zoology 234S. 3 units. *Brandon*

235S. Hegel and Marx. Hegel's philosophy and its influence on Marx. 3 units. *Roderick*

250S. Topics in Formal Philosophy. Topics selected from formal logic, philosophy of mathematics, philosophy of logic, or philosophy of language. 3 units. *Posy*

251S. Epistemology. Selected topics in the theory of knowledge, for example, conditions of knowledge, scepticism and certainty, perception, memory, knowledge of other minds, and knowledge of necessary truths. 3 units. *Sanford*

252S. Metaphysics. Selected topics: substance, qualities and universals, identity, space, time, causation, and determinism. 3 units. *Sanford*

253S. Philosophy of Mind. Analysis of concepts such as thought and belief; issues such as mind-body relations, thought and action, the nature of persons, and personal identity. 3 units. *Sanford*

254S. Philosophy of Religion. Topics such as proofs of the existence of God; meaningfulness of religious language; the problems of evil, immortality, and resurrection. 3 units. *Staff*

291S, 292S. Special Fields of Philosophy. 3 units each. *Staff*

For Graduates

300S. Problems in the Theory of Value and Judgment. See C-L: Literature 300. 3 units. *Smith*

311. Philosophy and Medicine. The scope of medicine as a philosophical problem, the concept of health, and investigation of ethical issues arising in medical contexts. Prerequisite: consent of instructor. 3 units. *Golding*

COURSES CURRENTLY UNSCHEDULED

202S. Aesthetics: The Philosophy of Art

230S. The Meaning of Religious Language

232S. Recent Continental Philosophy

331, 332. Seminar in Special Fields of Philosophy

Physical Therapy

Professor Bartlett, *Chairman* (045 Hospital); Associate Professor Branch, *Director of Graduate Studies* (045 Hospital); Associate Professors Villanueva and Malone; Assistant Professors Duncan, Gwyer, and Horton; Assistant Clinical Professor Riordan; Clinical Associates Chandler, Dore, and Lawrence

The Department of Physical Therapy offers an entry level professional program leading to the M.S. degree. To be eligible for admission to the program, applicants must have obtained a baccalaureate degree and have a background in the basic sciences and social sciences, including course work in biology, chemistry, physics, and psychology.

The program is designed to provide for integration of classroom knowledge and clinical learning experiences essential for the competent practice of physical therapy. In view of this integrated curriculum, failure in a major course within a semester would prevent the student from continuing in the program. Major courses are all courses offered by the Department of Physical Therapy as well as required courses offered by the Department of Anatomy. A grade of *F* (or *noncredit* in the case of Physical Therapy 342, 343, and 344) in any of these courses will occasion withdrawal from the program. Program requirements also include a comprehensive examination at the completion of the curriculum and a research project. Further information may be obtained from the Director of Graduate Studies, Department of Physical Therapy, Box 3965, Duke University Medical Center, Durham, North Carolina 27710.

210. Independent Study. Designed for nonmajors. Prerequisite: consent of instructor. Credit to be arranged. *Staff*

301. Introduction to Scientific Inquiry. Theory and methods of research process, research design, data collection, preparation of a research proposal. 2 units. *Gwyer and staff*

302. Research. Development of a research project protocol. 1 unit. *Staff*

303. Research. Completion of a research project under the supervision of a faculty adviser; instruction in statistical techniques and the use of the computer. 3-5 units. *Staff*

313. Physical Agents. Physical aspects and physiological effects of selected physical agents, including massage, superficial heat and cold, ultraviolet, diathermy, and ultrasound. 2 units. *Branch*

314. Electrotherapy and Electrodagnosis. Physical aspects and therapeutic effects of electrical currents. Electrodiagnostic testing, introduction to electromyography and nerve conduction studies, and principles and application of biofeedback. 1-2 units. *Staff*

317. Kinesiology. Fundamentals of arthrology and myology, movement and joint description, surface anatomy, principles of biomechanics and anthropometry. 2 units. *Villanueva*

318. Arthrology and Pathokinesiology. Detailed study of the arthrology and kinesiology of the trunk and limbs during normal and pathological conditions, with emphasis on the sequential electromyographic and joint motion analysis of body segments during selected human movement patterns, including locomotion. 3 units. *Villanueva*

319. Introduction to Evaluation and Patient Care. Orientation to basic patient care skills, including reaction to illness. Introduction to Problem-Oriented Record System. Principles and methods of evaluation, including assessment of muscle function, joint mobility, neurological and respiratory function, posture, gait, and physical level of independence. Opportunities for direct patient care in laboratory and clinic. 3 units. *Horton and Villanueva*

320. Evaluation and Therapeutic Procedures I. Specific assessment of neuromuscular and cardiopulmonary functions. Physiological basis of therapeutic intervention and specific exercise programs. 3 units. *Duncan*

321. Evaluation and Therapeutic Procedures II. Assessment and treatment of specific neuromuscular and cardiopulmonary problems. Introduction to techniques of neuromuscular facilitation. 2 units. *Duncan and staff*

322. Evaluation and Therapeutic Procedures III. Introduction to the neurophysiological basis for evaluation and treatment of children and adults with central nervous system disorders; emphasis on assessment of abnormal movement and selection of appropriate therapeutic programs. Problems associated with spinal cord injuries, methods of therapeutic intervention, and functional testing. 3 units. *Bartlett and Duncan*

332. Physical Therapy and Health Services: Administration and Issues. Planning, organizing, delivering, and evaluating physical therapy and health services. Examination of health policy and issues. Principles of administration, leadership styles, and management roles. 2 units. *Bartlett and Riordan*

333. Pediatrics. Description and observation of the development of the normal child, followed by the discussion of various pediatric problems. 2 units. *Staff*

334. Introductory Pathology. A review of normal cells and tissues; fundamentals of pathology with emphasis on broad concepts of disease. 2 units. *Branch*

335. Orthopedics. Detailed examination of the musculoskeletal system, through lecture and laboratory, and the application of findings to the establishment of physical therapy care plans. Introduction to common orthopedic problems and their medical and surgical management. 2 units. *Lawrence*

336. Medical Sciences. The clinical manifestations and management of common medical and surgical disorders. Lectures by physicians, physical therapists, clinical pharmacists, and other health personnel; selected laboratory experiences. Areas covered include prosthetics and orthotics, burns, rheumatology, cardiopulmonary disorders, neurology, neurosurgery, hematology, and gerontology. Seminars in patient management. 3 units. *Branch and staff*

340. Special Topics in Physical Therapy. Opportunity for study under the direction of an individual staff member. Prerequisite: consent of Director of Graduate Studies. Credit to be arranged. *Staff*

342. Directed Clinical Experience in Physical Therapy I. Short-term observational and supervised learning experiences in local physical therapy settings. 1 unit. *Clinical staffs*

343. Directed Clinical Experience in Physical Therapy II. Full-time supervised clinical learning experiences in physical therapy settings within limited radius of the University. 2 units. *Clinical staffs*

344. Directed Clinical Experience in Physical Therapy III. Full-time supervised clinical learning experiences in physical therapy settings throughout the country. 3 units. *Clinical staffs*

COURSES CURRENTLY UNSCHEDULED

304. Seminar in Applied Neurophysiology

324. Prosthetics and Orthotics

Physics

Professor Evans, *Chairman* (118 Physics); Professor Goshaw, *Director of Graduate Studies* (112 Physics); Professors Biedenharn, Bilpuch, De Lucia, Fortney, Han, Herbst, Meyer, Roberson, Robinson, Walker, Walter, and Weller; Associate Professors Behringer, Green-side, Palmer, and Thomas; Assistant Professors Howell and Oh; Professor Emeritus Lewis; Adjunct Professors Ciftan, Guenther, O'Foghludha, Robl, and Stroschio

The Department of Physics offers graduate work for students wishing to earn the A.M. or Ph.D. degree. In addition to a balanced program of basic graduate courses, the department offers specialized courses and seminars in several fields in which research is being done by faculty and staff.

With the help of faculty advisers, students select a course program to fit their needs, including work in a related field, usually mathematics or chemistry. Students are encouraged to begin research work early in their careers.

For Seniors and Graduates

211. Modern Physics. Fundamental concepts of quantum theory applied mainly to study of atomic structure and spectra, and to statistical physics. Prerequisites: Physics 181 and Mathematics 111. 3 units. *Herbst*

215. Introduction to Quantum Mechanics. Fundamental postulates; wave mechanics and elementary applications; operators, eigenvalues, and eigenfunctions; angular momentum and rotations; spin and coupling of angular momenta; perturbation theory, transition rates, and selection rules; identical particles; applications. Prerequisites: Physics 181 and 211; Mathematics 111 and 114 (may be taken concurrently). 3 units. *Robinson*

217S, 218S. Advanced Physics Laboratory and Seminar. Experiments involving the fields of electricity, magnetism, heat, optics, and modern physics. 6 units. *Meyer*

220. Electronics. Basic elements of modern electronics including AC circuits, transfer functions, solid-state circuits, transistor circuits, operational amplifier applications, digital circuits, and computer interfaces. 3 units. *Fortney*

240. Computer Applications to Physical Measurement. Hardware and software techniques for computer-assisted data acquisition, display, and control in the modern experimental environment. Theory and application of discrete signal analysis including digital filters, Z-transform, and fast Fourier transform. Lecture and laboratory. Prerequisite: Physics 171 or 220 or consent of instructor. 3 units. *Fortney*

244. Nuclear and Particle Physics. Current ideas and models in nuclear and particle physics. Experimental methods; nuclear structure; nuclear reactions; families of elementary particles; quarks and gluons; weak interactions. Prerequisite: Physics 211. 3 units. *Oh*

For Graduates

302. Advanced Mechanics. The fundamental principles of Newtonian mechanics, general dynamics of systems of particles and rigid bodies, the methods of Lagrange and Hamilton, generalized mechanics. 3 units. *Han*

303. Statistical Mechanics. Fundamental laws of thermodynamics and statistical mechanics with applications to physics and chemistry. Classical and quantum ideal gases; approximate methods for real gases and liquids. Prerequisite: Physics 215. 3 units. *Behringer*

304. Advanced Topics in Statistical Mechanics.* This course will vary from year to year. Possible topics include Fermi liquids, systems of bosons, many-body theory, non-equilibrium statistical mechanics. Prerequisites: Physics 303 and 316. 3 units. *Staff*

305. Introduction to Nuclear Physics. Phenomenological aspects of nuclear physics, interaction of gamma radiation and charged particles with matter, nuclear detectors, particle accelerators, radioactivity, basic properties of nuclei, nuclear systematics, nuclear reactions, particle scattering, nuclear models of the deuteron, nuclear forces, parity. 3 units. *Weller*

308. Introduction to High-Energy Physics. High-energy processes; electromagnetic, weak, and strong interactions. Experimental instrumentation. 3 units. *Goshaw or Walker*

309. Solid-State Physics I. Properties of matter in the condensed state; crystal lattices, electrons in metals and semiconductors, band theory, nonmetallic solids, lattice dynamics, and phonons. Prerequisites: Physics 215 and 303. 3 units. *Palmer*

316. Principles of Quantum Theory. Original and fundamental concepts of quantum theory, wave and matrix mechanics, theory of measurements, exclusion principle, and electronic spin. Prerequisites: Physics 215 and 302. 3 units. *Thomas*

*Offered on demand.

317. Intermediate Quantum Theory. General operator methods, angular momentum, Dirac electron theory. Second quantization; symmetry principles and conservation theorems. Applications to the theory of solids, of nuclei, and of elementary particles will be stressed. Prerequisite: Physics 316. 3 units. *Thomas*

318-319. Electromagnetic Field Theory. Electrodynamics, theory of wave optics, radiation of electric and magnetic multipole fields, special relativity, covariant electrodynamics, Lienard-Wiechert potentials, scattering and dispersion, Hamiltonian field equations. Prerequisite: Physics 182. 3 units each. *Evans*

331. Quantum Electronics.* Electromagnetic radiation and its interaction with matter. Lasers, nonlinear optics, submillimeter waves, detection theory, propagation. 3 units. *De Lucia*

333. Electronic Properties of Submicron Solid State Devices. Doping, disordering, and grading in heterojunctions and superlattices. MOCVD and MBE growth techniques. Physical properties of submicron electronic devices, high speed transport, mobility, energy band structure, and scattering processes. Classical and quantum transport, quantum state transfer, control deformation of electron wave functions, mobility modulation, and phonon dynamics. Two-dimensional electron gases and plasmas. Monte Carlo simulation of submicron device performance. Current research and recent developments will be emphasized. C-L: Electrical Engineering 333. 3 units. *Strosio*

334. Atomic Physics and Spectroscopy. The interaction of atoms and radiation: atomic structure. Spontaneous and stimulated transitions. Shapes of spectral lines. Radiative transfer. Population inversion. Laser oscillation. (Resonant modes of optical cavities.) Techniques of laser spectroscopy. 3 units. *Holmgren*

335. Molecular Spectroscopy. Interpretation and theory of electronic, vibrational, rotational, and nuclear hyperfine states. Bound state quantum mechanics. Emphasis on small fundamental species of importance in science and technology. 3 units. *De Lucia*

341. Advanced Topics in Quantum Theory. Introduction to relativistic quantum field theory, Lorentz and Poincaré groups, quantization of free fields, interacting fields and S-matrix, applications of quantum electrodynamics and dispersion relations. Prerequisite: Physics 317. 3 units. *Biedenharn*

345. Advanced High Energy Physics. Experimental and theoretical aspects of high energy nuclear processes; properties of mesons and hyperons. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

214. Introduction to Solid-State Physics

306. Low Temperature Physics

310. Solid-State Physics II

312. Phase Transitions and Critical Phenomena

330. Nuclear Structure Theory

342. Theory of Elementary Particles

343. Nuclear Physics

344. Advanced Nuclear Physics

346. Topics in Theoretical Physics

351, 352. Seminar

397, 398. Low Temperature and Solid-State Seminar

*Offered on demand.

Physiology

Professor Johnson, *Chairman* (302 Nanaline H. Duke); Professor Simon, *Director of Graduate Studies* (370 Nanaline H. Duke); Professors Blum, Diamond, Gutknecht, Jöbsis, Lieberman, Mandel, Moore, Reynolds, Somjen, Spach, and Tanford; Associate Professors N. Anderson, Bennett, C. Bonaventura, J. Bonaventura, Caron, Erickson, Greenfield, Kootsey, Kylstra, McManus, Mills, Padilla, Schomberg, and Wolbarsht; Assistant Professors P. A. W. Anderson, Anholt, Camporesi, Dennis, Handwerger, Wallace, Wechsler, and Yarger; Adjunct Assistant Professor Carter; Associate Medical Research Professors Hines and Sylvia

The Department of Physiology offers graduate work leading to the Ph.D. degree. Before undertaking this program a student should have a strong background in basic sciences including course work in mathematics, biology, physics, and chemistry through physical chemistry. Undergraduates with this background may have majors in any of the following areas: biology, chemistry, physics, mathematics, engineering, or computer sciences. There is no foreign language requirement.

For Seniors and Graduates

200. Medical Physiology. Limited to students whose training requires knowledge of human physiology as it pertains to medicine. Four lectures, one conference, and one clinical correlation per week. Open to undergraduates only with consent of course leader. Fall. 4 units. *Padilla and staff*

202. Basic Neurobiology. An integrated interdepartmental course designed for first-year medical students and other professional and graduate students who need a core course on the morphology and functions of the mammalian nervous system. Lectures, laboratory demonstrations, clinical conferences, and lecture conferences during the month of January only. Prerequisites: Anatomy 305, 307, Biochemistry 200, and Physiology 200, or equivalents. C-L: Anatomy 309. 4 units. *Hall, Kirshner, Somjen, and staff*

204. Introduction to Modern Physiology. Flow of fluids in tubes, ion transport mechanisms, and endocrine systems are examined in terms of how such processes enter into the functioning of intact organs such as heart, lung, gut, and central nervous system. Particular emphasis is given to the control of physiological function both at the cellular and higher levels of organization. Required of all graduate students in physiology. Others must have consent of instructor. Prerequisites: at least one year each of physics and calculus and biology; chemistry through organic chemistry; physical chemistry is strongly recommended. Spring. 4 units. *Blum and staff*

205. Design and Analysis of Biological Experiments. An introductory level course for individuals engaged in or planning research projects in the life sciences. Emphasis is on development of an adequate background in the fundamentals of probability, statistics, and hypothesis testing for application of these principles to commonly encountered research situations. The course will include lectures, hands-on use of the Statistical Analysis System (SAS) computer package for data analysis and critical evaluation of experimental designs employed in representative studies from the literature. 2 units. *Lobaugh*

208. Respiratory System in Health and Disease. Primary emphasis on the physiology of respiration. Topics include pulmonary mechanics; gas exchange; ventilation-perfusion relationships; central and peripheral regulation of ventilation and respiratory responses to exercise, altitude, and hyperbaric environments. Prerequisite: consent of instructor. Spring. 2 units. *Kylstra*

210. Individual Study. Directed reading and research in physiology. Prerequisite: consent of Director of Graduate Studies. C-L: Marine Sciences. 3 to 9 units each. *Staff*

217. Membrane Transport. Basic principles of the transport of water and solutes across biological and model membranes. The course uses physicochemical principles to provide a comprehensive understanding of phenomena such as active and passive transport, energy barriers through membranes, surface effects, and ion selectivity. The methodology and conceptual framework for the study of transport is described with selected examples from bilayers, red blood cells, nerve, and epithelia. Physical chemistry is recommended. Prerequisite: consent of instructor. Spring. 3 units. *Mandel and Simon*

225. Neurobiology of Sensory Systems. Prerequisites: Anatomy 201, 202 and Physiology 200, 201, or equivalents, or consent of instructor. See C-L: Anatomy 225. 3 units. *Simon, Corless, and staff*

230. Molecular and Cellular Bases of Differentiation. See C-L: Anatomy 219; also C-L: Biochemistry 219, Microbiology and Immunology 219, and Pathology 219. Fall. 3 units. *Padilla and staff*

280. Student Seminar in Physiology. Preparation and presentation of seminars to students and faculty on topics of broad interest to physiology. Required of all physiology students. 2 units. *Simon*

For Graduates

320. Gastrointestinal Physiology. The normal physiology, mechanisms of control, and transport characteristics of the gastrointestinal tract and its associated glands and organs (salivary, pancreas, liver) are presented. The mechanisms of secretion, reabsorption, and motility are treated at a cellular level. Numerous pathophysiological examples are presented and their clinical implications are emphasized. Spring. 2 units. *Akwari, Mandel, and staff*

321. Renal Physiology. Basic renal mechanisms involved in the elaboration of urine including concentrating and diluting mechanisms, hemodynamics, and regulation of acid-base balance. Both basic physiological processes and pathophysiological alterations will be considered. Spring. 2 units. *Dennis and staff*

350. Neurobiology of Diseases. Disorders of the nervous system will be discussed by panels of clinicians and basic scientists. Sessions will be divided into equal periods of clinical presentation, scientific analysis, and free discussion with student participation. Prerequisites: Anatomy 305, 307, and Physiology 200, 202, or equivalents. C-L: Pharmacology 350 and Pathology 350. Fall. 2 or 3 units. *Somjen and staff*

370. Neurobiology I. See C-L: Pharmacology 370; also C-L: Anatomy 370. Taught alternate years in the fall semester. 3 units. *Kirshner and staff*

372. Research in Physiology. Laboratory investigation in various areas of physiology. Credit to be arranged. *Staff*

390. Membrane Biology. Various aspects of cell membranes and membrane proteins and lipids. Specific topics are chosen based on student interest and current literature discussed. Prerequisite: consent of instructor. Spring. 2 units. *Reynolds*

401. Metabolic Physiology. The control of gluconeogenesis, protein degradation, the storage and mobilization of glycogen and of lipids will be examined both at cellular level (e.g., metabolic compartmentation, futile cycling, enzyme modification) and in terms of interactions between tissues such as liver, kidney, and muscle. Strategies for metabolic adaptation to exercise, cold environment, starvation, obesity, and birth will be discussed. Prerequisites: Physiology 204 and one year of biochemistry. Taught in alternate years in the fall semester. 3 units. *Blum*

417. Cellular Endocrinology. Current concepts of the mechanisms of action of hormones at the cellular level, including hormone-receptor interactions, secondary messenger systems for hormones, mechanisms of regulation of hormone responsiveness, regulation of growth, differentiation and proliferation, cellular and electrophysiological mechanisms of secretory stimulus sensing and transduction, systems approach to feedback regulation and information transfer in an endocrine system. Lectures by local and outside clinical faculty will stress the clinical correlation of the basic concepts elaborated in the course. Students will be expected to participate in one seminar presentation. C-L: Pharmacology 417. Fall. 2 units. *N. Anderson, Caron, Padilla, and guest lecturers*

418. Reproductive Biology. An in-depth study of male and female reproductive processes including hypothalamic, pituitary, and gonadal control mechanisms, as well as the physiology of pregnancy and parturition. Lectures by guest clinical faculty will emphasize the interface between basic science and clinical medicine. The lecture material in each section of the course is followed by seminar presentations which will contribute to Physiology 424, a corequisite for the course. C-L: Anatomy 418. Spring. 2 units. *N. Anderson, Schomberg, and Tyrey*

424. Seminar in Reproductive Biology. Selected topics in reproductive biology will be chosen for in-depth reading and analysis in the seminar format. Can be taken independently or corequisite with Physiology 418. C-L: Anatomy 424. Spring. 1 unit. *N. Anderson, Schomberg, and Tyrey*

COURSES CURRENTLY UNSCHEDULED

203. Introduction to Biophysics and Biophysical Chemistry

207. The Heart in Health and Disease

281. Teaching in Physiology

301. Oxygen and Physiological Function

302. Advanced Topics and Research Seminar in Smooth and Striated Muscle

362. Cardiac Muscle Physiology

383. Physiological Instrumentation

416. Biophysics of Excitable Membranes

419. Topics in Mathematical Physiology

420. Cellular Immunophysiology

Political Science

Professor Kornberg, *Chairman* (214 Perkins); Associate Professor Lange, *Director of Graduate Studies* (331 Perkins); Professors Aldrich, Ascher, Barber, Bates, Braibanti, Fish, Holsti, Horowitz, Hough, Leach, Paletz, Price, and Spragens; Associate Professors Eldridge, Johns, and McKean; Assistant Professors Bianco, Booth, Canon, Entman, Gillespie, Grant, Grieco, Kitschelt, Lomperis, and Roberts; Professors Emeriti Ball, Cleaveland, Cole, Grzybowski, Hall, Hallowell, Kulski, and Simpson; Adjunct Associate Professor O'Barr

The Department of Political Science offers graduate work leading to the A.M. and Ph.D. degrees. Before being admitted to candidacy for the Ph.D. degree, an applicant must have qualified for the A.M. degree.

Instruction is designed to prepare the student for teaching and research, for government service, and for other work related to public affairs. Before undertaking graduate

study in political science, a student is ordinarily expected to have completed at least 12 semester hours of course work in political science. Instruction is currently offered in the following fields: American government and politics, comparative government and politics, political theory, and international relations.

The candidate for the degree of Doctor of Philosophy in political science must take at least sixteen courses in all, including twelve in the department, and demonstrate competence in at least two general fields of the discipline as well as in a third general field or in a specialized subfield or in a field external to the department. The candidate must also demonstrate a reading knowledge of two foreign languages or must demonstrate proficiency in one foreign language and in the use of statistics.

The terminal degree of Master of Arts, for those who do not intend to continue with doctoral studies, is awarded following successful completion of: (1) eight one-semester courses of 3 units each, at least half of which must be in political science; and (2) the A.M. thesis. In addition, candidates for the A.M. degree must demonstrate competence in one foreign language or in statistics.

Further details on the graduate program in political science, the departmental facilities, the staff, and available financial aid may be obtained from the Director of Graduate Studies, Department of Political Science.

For Seniors and Graduates

201S. Problems in International Security. Major security issues. Prerequisite: a course in international relations or foreign policy. 3 units. *Staff*

203S. Politics and the Media of Mass Communication. Analysis of crucial aspects of the media-politics relationship. Media's effects on political socialization, public opinion, political participation, pluralism, power, and authority. Government's impact on the media. Prerequisite: consent of instructor. 3 units. *Paletz*

204S. Ethics in Political Life. Ethical issues arising in the conduct of political vocations and activities. C-L: Public Policy Studies 204S. 3 units. *Spragens*

207S. American Constitutional Interpretation. Development of the Constitution of the United States through Supreme Court decisions. 3 units. *Fish*

208S. Analyzing the News. See C-L: Public Policy Studies 240S. 3 units. *Entman*

209. Problems in State Government and Politics. 3 units. *Leach*

211S. Current Problems and Issues in Japanese Politics. Sources of strength and weakness in the Japanese economy, the rise of new issues and strains in postindustrial society, changes in the party system and decision-making process, the possible transfer of power, the challenge of Japan's new world role. 3 units. *McKean*

212S. Domestic Structures and Foreign Policies of Advanced Democratic States. The influence of democratic institutions on the national-security and foreign-economic policies of advanced industrialized states. 3 units. *Grieco*

213S. Theories of International Political Economy. Comparison and assessment of traditional and modern theories in terms of their logical and empirical validity. 3 units. *Grieco*

215S. Philosophical Bases of Political Economy and Society. Central questions in the relationship between economy and society through an examination of the classical texts of political economy. Themes include: democracy and capitalism, the world economy and foreign policy, critiques of capitalism from the left and right. Readings drawn from Adam Smith, Karl Marx, J. M. Keynes, Joseph Schumpeter, Milton Friedman, and others. 3 units. *Booth*

216S. Evolution of European Marxism. The central themes in the evolution of European marxism: socialist thought prior to Marx; the writings of Marx and Engels. The themes are articulated in: Russian Marxism; Soviet communism and its Marxist critics; the rethinking of Marx's political economy, the theory of the state, and concepts of class consciousness in the works of twentieth-century European Marxists. 3 units. *Booth*

218. Political Thought in the United States. American political thought through the Civil War period. The Founders and their European antecedents. Debates over the Constitution, slavery, and the Union. 3 units. *Grant or Gillespie*

220S. Problems in International Politics. Prerequisite: one course on international relations or foreign policy or diplomatic history. 3 units. *Holsti or Hough*

221S. International Institutions and the World Political Economy. Examination of theory concerning the role of international institutions in facilitating economic cooperation among advanced democratic states. Investigation of the impact on international economic relations of such multilateral institutions as the International Monetary Fund, the World Bank, the General Agreement on Tariffs and Trade, and the International Energy Agency. 3 units. *Grieco*

222S. Seminar: Modern Political Classics. How social scientists think about politics. Works influential in shaping contemporary political science, written by political scientists, economists, and sociologists. Topics include democracy, capitalism, socialism, voting, and collective action. 3 units. *Staff*

223. Ancient Political Philosophy. Intensive analysis of the political philosophy of Plato, Aristotle, and other ancient theorists. 3 units. *Gillespie or Grant*

224S. Modern Political Theory. A historical survey and philosophical analysis of political theory from the beginning of the seventeenth to the middle of the nineteenth century. The rise of liberalism, the Age of Enlightenment, the romantic and conservative reaction, idealism, and utilitarianism. 3 units. *Spragens or Grant*

225. Topics in Comparative Government and Politics: Western Europe. Topics vary: the development of mass democracy and the welfare state; political and electoral participation and mobilization; social movements and political change; center-periphery conflicts; government and bureaucratic institutions and their relationships to society; the modern welfare state and political economy. 3 units. *Kitschelt or Lange*

226S. Theories of International Relations. An overview with applications to political-military and political-economic empirical problems. 3 units. *Grieco*

227. International Law. Theory and practice of international law: rights and duties of states with respect to recognition, state territory and jurisdiction, treaties, settlement of disputes, and other topics. 3 units. *Staff*

228S. Nineteenth- and Twentieth-Century Political Philosophy. Topics in nineteenth- and twentieth-century political philosophy, considering such authors as Hegel, Marx, Nietzsche, Dostoevski, Heidegger, Malraux, and Camus. 3 units. *Booth or Gillespie*

229S. Contemporary Theory of Liberal Democracy. Reading of major works and discussion of current issues in contemporary liberal and democratic theory. 3 units. *Spragens*

230S. Introduction to Positive Political Theory. Basic concepts of political economy, theory of preference and choice, social choice theory, and decision and game theory. 3 units. *Aldrich, Bates, or Bianco*

231S. Crisis, Choice, and Change in Advanced Democratic States. Contribution of Marx, Weber, and Durkheim toward analysis of modern democracies. Examination of selected contemporary studies using these three perspectives to highlight processes of

change and crisis. Unsettling effects of markets upon political systems, consequences of bureaucratic regulation, and transformation of sources of solidarity and integration in modern politics. 3 units. *Kitschelt*

232. Political Economy: Theory and Applications. Selected topics. 3 units. *Lange*

233S. Quantitative Political Analysis II. Intermediate statistical methods, especially linear regression, for political science research. Emphasis on assumptions and interpretations of results. Prerequisite: Political Science 138 or 236 or equivalent. 3 units. *Staff*

234S. Political Economy of Development: Theories of Change in the Third World. Alternative approaches to political, economic, and social change in Latin America, Africa, and Asia. C-L: Anthropology 234S, History 234S, and Sociology 234S. 3 units. *Bates, Bergquist, Fox, Gereffi, Smith, or Trouillot*

235S. Comparative Development of Islam. Comparative development of Islam in Indonesia, Malaysia, Pakistan, India, North Africa, and sub-Saharan Africa. A comparative analysis of the resurgence of Islam as a religious, political, and cultural force. 3 units. *Braibanti*

236. Statistical Analysis. Introduction to statistics in political research, emphasizing research design, descriptive and inferential statistics, and use of computers. Not open to students who have had or who are enrolled in Political Science 138, Economics 138, Mathematics 53 or 117, Psychology 117, Public Policy Studies 112 or 122, or Sociology 132 or 293. 3 units. *Staff*

237S. Comparative Public Policy. Introduction to methods, concepts, and theories of comparative public policy analysis. Substantive policies examined in the course vary each semester and may include economic, industrial, social, and civil rights policies. 3 units. *Kitschelt*

240. American Political Behavior. 3 units. *Staff*

242S. Comparative Law and Policy: Ethnic Group Relations. Various approaches to the reduction of conflict in deeply divided societies, primarily in Asia and Africa, with secondary attention to Western countries. The nature of ethnic identity, the sources of group conflict, and the forms and patterns it takes. Methods of analyzing social science materials and utilizing them for the design of policies, laws, and institutions. 3 units. *Horowitz*

243S. Political Applications of Game Theory (C). Theory of games as a tool to understand strategic behavior of political actors. Applications to legislative politics, international cooperation, bureaucratic behavior. 3 units. *Bianco*

245. Ethics and Policy Making. Not open to students who have taken Public Policy Studies 116. See C-L: Public Policy Studies 223. 3 units. *Kuniholm or staff*

246S. Political Hypocrisy and Idealism. The cases for and against hypocrisy in political and social life. The concept of authenticity as the alternative to hypocrisy. Selections from Machiavelli, Shakespeare, Rousseau, Nietzsche, and others. 3 units. *Grant*

248. The Politics of the Policy Process. See C-L: Public Policy Studies 219. 3 units. *Entman*

249. Comparative International Development and Technology Flow. Theoretical analysis of social, political, and economic development in Third World countries. The internal problem of maintaining political systems and the external problem of adapting intermediate or appropriate technologies. 3 units. *Braibanti*

251S. The American Presidency. The presidency and its impact on the American political system. 3 units. *Paletz*

253S. Comparative Government and the Study of Latin America. Current literature on major themes of Latin American politics. 3 units. *Staff*

255. Political Sociology. See C-L: Sociology 255. 3 units. *Smith or Tiryakian*

256S. Arms Control and National Security Policy. The evolution of nuclear weapons and strategy and of global defense policy toward the Soviet Union and other adversaries; the arms control process and nonproliferation. Prerequisite: consent of instructor. 3 units. *Lomperis*

259S. Low Intensity Conflict and the Lessons of Viet Nam. The Viet Nam conflict and comparative cases; implications for Western interventions in the Third World. Prerequisite: consent of instructor. 3 units. *Lomperis*

260S. The Tradition of Political Inquiry. Past and present problems, goals, presuppositions, and methods. 3 units. *Spragens*

261. Politics and the Future. The projection of possible political orders: the effects of changing resources, technologies, and values on mankind's ability to govern. 3 units. *Lomperis*

262S. International Communism. 3 units. *Hough*

263S. Methods of Political Science. The relation between theory and evidence; research designs for the comparative analyses of historical and statistical evidence. 3 units. *Roberts*

267S. Policy Making in International Organizations. See C-L: Public Policy Studies 267S. 3 units. *Ascher*

270S. Fundamentals of Political Economy. Application of economic reasoning to the study of politics. Analysis of campaigns and elections, legislatures, and the regulation of industries. C-L: Economics 270S. 3 units. *Aldrich, Bates, or Bianco*

275. The American Party System. An intensive examination of selected facets of American national political parties, such as relationships between presidential and congressional politics, the politics of national conventions, recent foreign policy and party alignments, and the controversy over party government. 3 units. *Kornberg*

277. Comparative Party Politics. The impact of social and political systems on party structures, functions, ideologies, and leadership recruitment. Emphasis upon research techniques and objectives. 3 units. *Kornberg or Lange*

279S. Political Protest and Collective Mobilization. Survey of theories, methods, and empirical studies of political mobilization outside institutional channels; protest behavior and strategies; responses of the state to these challenges; the success of collective mobilization. Emphasis on comparative analyses of protest in advanced industrial democracies. 3 units. *Kitschelt*

282S. Canada. Topics vary each semester and may include nationalism in Canada, Canadian defense policies, Canadian-American relations, regionalism in Canada, environmental issues, and others. C-L: Anthropology 282S, History 282S, and Sociology 282S. 3 units. *Staff*

283S. Congressional Policy Making. Lawmaking and oversight of the executive branch by the United States Congress. Committee, party, executive, and interest group roles. C-L: Public Policy Studies 283S. 3 units. *Bianco or Canon*

284S. Public Policy Process in Developing Countries. See C-L: Public Policy Studies 284S. 3 units. *Ascher*

286S. Judicial Administration. Organization, case processing, and management of courts with emphasis on federal appellate courts. Prerequisite: Political Science 127. 3 units. *Fish*

293. Federalism. Theoretical and operational aspects of federal systems of government, focusing on the United States and Canada. 3 units. *Leach*

299. Special Topics in Government and Politics. Topics vary from semester to semester. 3 units each. *Staff*

- A. American Government and Politics
- B. Comparative Government and Politics
- C. Political Theory
- D. International Relations

For Graduates

303. Seminar on Statistics. Application of advanced statistical methods to political science research problems. Primary focus on multiple regression procedures. Emphasis on assumptions, interpretation of results, and use of the computer. Prerequisite: Political Science 236 or consent of instructor. 3 units. *Staff*

305. Seminar in U.S. Foreign Policy. Decision-making in American foreign policy. The sources, substance, and consequences of U.S. policy will be examined. The emphasis is on the period since 1945. 3 units. *Holsti*

306. Political Development of the U.S. Fourth Circuit Courts. A research seminar on federal trial and appellate courts, judges, and law: Maryland, Virginia, West Virginia, North and South Carolina, 1789-1958. 3 units. *Fish*

308. Individual Research. Students will conduct research designed to evaluate hypotheses of their choice. Reports on the research must be presented in appropriate professional style. 3 units. *Staff*

309. Seminar in International Relations. Critical survey of theories and research in international relations and foreign policy. Emphasis will be placed on the interrelation between theory and research. 3 units. *Holsti*

321. Seminar in Political Theory. Prerequisites: 6 units in political science elected from 223, 224, 229, 231, or their equivalents. 3 units. *Staff*

322. Topics in Early Modern Political Thought. Selected readings from political thinkers ranging from Machiavelli to Mill. 3 units. *Spragens or Grant*

324. Seminar in Comparative Politics (A). A field survey with emphasis on the politics of developing areas. Note: it is generally expected that political science graduate students taking comparative politics as a preliminary field will take both this course and Political Science 325. 3 units. *Staff*

325. Seminar in Comparative Politics (B). A field survey with emphasis on the politics of advanced industrial democracies. Note: it is generally expected that political science graduate students taking comparative politics as a preliminary field will take both this course and Political Science 324. 3 units. *Staff*

326. Research Seminar in Comparative Government and Politics. Seminar in major issues in comparative politics and intensive individual student research projects. 3 units. *Staff*

327. Comparative Political Behavior (B). This seminar critically examines research on variations in elite and mass behavior as well as the conditions affecting that behavior in a variety of western countries. 3 units. *Kornberg*

332. Seminar on Political Economy: Micro Level. Survey of recent work in political science and economics on the organization of institutions: political, sociological, and economic. Focus upon the ways in which rational choice theory is applied to areas outside of economics. Three units. *Bates*

333. Seminar in Political Economy: Macro Level. Survey and analysis of recent work in political science, economics, and sociology on the relationships between states and markets. Special emphasis on the ways states influence market outcomes and the ways the organization of power in markets influences state behavior, especially in democratic systems. 3 units. *Lange*

340. Seminar in American Politics and Institutions. Survey, analysis, and critique of the literature. 3 units. *Paletz or staff*

381. Research Seminar in Latin American Government and Politics. Prerequisite: Political Science 253 or equivalent. 3 units. *Valenzuela*

397. Selected Topics in Government and Politics. Topics vary from semester to semester. 2 units. *Staff*

398. Selected Topics in Government and Politics. Topics vary from semester to semester. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

214S. The Politics of Scarcity

280S. Comparative Government and Politics: Sub-Saharan Africa

360. Seminar in Government and Politics in the Soviet Union

RELATED COURSE WORK IN THE SCHOOL OF LAW

There may be graduate credit for course work completed in the Duke University School of Law, under regulations referred to in this bulletin under the section on academic regulations.

Psychology

Professor R. Erickson, *Acting Chairman* (224 Psychology-Sociology); Professor Hasher, *Director of Graduate Studies* (225 Psychology-Sociology); Professors Alexander, Carson, Coie, Costanzo, Diamond, C. Erickson, W. G. Hall, Lakin, Lockhead, Rubin, Staddon, M. Wallach, and Wing; Associate Professors Day, Eckerman, Holland, and Roth; Assistant Professors Kremen and Putallaz; Professors Emeriti Borstelmann, Kimble, and H. Schiffman; Adjunct Professors Brodie, Crovitz, George, W. C. Hall, Maddox, S. Schiffman, Thompson, L. Wallach, and Weiss; Adjunct Associate Professors Casseday, Goldstein, Marsh, and Spenner

The department offers graduate work leading to the Ph.D. degree. The areas of concentration are biological, cognitive and sensory sciences, personality, developmental, and clinical. A brochure is available from the Director of Graduate Studies which describes the program in more detail and gives information on financial assistance, facilities, and current research activities. The psychology department has no foreign language requirement.

For Seniors and Graduates

200. Advanced Neuroscience I. Basic neuroanatomy and neurophysiology, physiology of the neuron and neural networks, neurotransmitter functions, sensory and motor systems. Fall semester. C-L: Zoology 200. 3 units (4 with laboratory). *R. Erickson and staff*

201. Advanced Neuroscience II. Integrative activities of the nervous system: sensory-motor relationships, neuroendocrine relationships, emotion and motivation, sleep, learning and memory, diseases of the nervous system and their psychological correlates. Spring semester. Prerequisite: Psychology 200. 3 units (4 with laboratory). *R. Erickson and staff*

203S. Sensation and Perception. Classical and current concepts and methods. 3 units. *Lockhead*

204S. Great Ideas in Psychology. Ideas in psychology drawn from various areas (perception, personality, motivation, biological bases, social, cognitive, developmental, learning, clinical) and various methodological approaches (experimental, introspection, observation, interview, longitudinal, simulation). Limited to junior/senior psychology majors and graduate students. 3 units. *Day*

206S. Stress and Health. Intensive study of the processes of stress and coping; the relationship between stress, health, and illness. The psychophysiology of stress emphasizing the nervous, cardiovascular, and endocrine systems; stress and affective disorders, especially depression. 3 units. *Thompson*

210S. Cognition. Schematic view of cognitive psychology plus intensive study of two to three specific research topics such as forms of representation, individual differences, and problem-solving models. Emphasis on alternative experimental and theoretical approaches. Prerequisite: Psychology 107 or graduate status. 3 units. *Day*

212S. Human Memory. Classical and modern literature, data, and theories relating to mechanisms of information processing, storage, and retrieval. 3 units. *Rubin*

214S. Development of Social Interaction. Major concepts and methods pertaining to early social development, emphasizing human social behavior and a developmental psychobiological approach. 3 units. *Eckerman*

215S. Cognitive Development. Major approaches to the development of knowledge, including Piaget, Thomas Kuhn, Vygotsky, Eleanor Gibson, Kohlberg, and others. 3 units. *L. Wallach*

217S. Advanced Social Psychology. The psychology of interpersonal influence and control; the cognitive and social factors affecting the perception of persons and social action; the dynamics of interpersonal relations and relationship formation and change; the contribution of individual differences to social behavior. Applications in environmental psychology, social psychology and law, and organizational psychology. 3 units. *Costanzo*

219S. Physiological Foundations of Psychology. Structure and function of the nervous system as related to problems of sensory-motor processes, learning, motivation, and memory. 3 units. *C. Erickson and R. Erickson*

220S. Psycholinguistics. Selected topics such as neurolinguistics, linguistic versus pictorial representation, individual differences, oral vs. written expression, language and personality, and the language-thought interaction. Prerequisite: Psychology 134 or graduate status. 3 units. *Day*

231S. Parent-Child Interaction. Examination of the empirical literature on parent-child interaction with emphasis on factors regulating parent behavior, individual differences in parenting, outcomes in children associated with different types of parenting, issues involved in compliance and internalization, and breakdown of normal parent-child behavior patterns. 3 units. *Staff*

234S. Advanced Personality. Selected topics of current interest concerning empirical research on personality. Strategies for the definition of research questions and the

evaluation of research progress. Prerequisite: consent of instructor. 3 units. *M. Wallach*

238S. Psychophysiology. A survey of experimental and clinical literature on brain wave correlates of intelligence, personality, behavior disorders, epilepsy, sleep, sensory stimulation, reaction time, and attention. Emphasis on the electrophysiology of conditioning and learning. 3 units. *Marsh*

255S. Perinatal Behavior. Consideration of behavior patterns of animals and humans before and just after birth, their neural organization, and the way that they are influenced by experience. 3 units. *W. G. Hall*

261S. Advanced Modern Learning Theory. The relation of modern viewpoints on the learning process to traditional ones; topics include animal and human learning. 3 units. *Holland*

266S. Comparative Neurobiology. The evolution and functional organization of the vertebrate brain. A study of the original papers of the pioneers in comparative anatomy. C-L: Anatomy 266S. 3 units. *Diamond and W. C. Hall*

267S. Brain Mechanisms of Behavior. General physiological principles of brain organization in relation to behavioral processes from sensation to concept formation. Discussions of original readings from seminal papers in the early nineteenth century to the present. 3 units. *R. Erickson*

270S. A-R, U-Z. Selected Problems. New courses not yet in the bulletin are designated as 170S or 270S depending on level. Since all faculty offer these courses, their contents vary accordingly. Different courses indicated by the letter. 3 units. *Staff*

273S. Statistical Principles in Experimental Design. The problems of scientific inference; methods of data analysis and issues in experimental design. 3 units. *Roth*

285S. Developmental Psychobiology. The development of motivation, learning, and reward mechanisms and their neurobiological basis. Animal studies and some human work. 3 units. *W. G. Hall*

286S. Biological Basis of Hearing. Anatomy and physiology of the auditory system; neural mechanisms for localization of sound, frequency discrimination, and discrimination of temporal patterns of sound such as speech; disorders of hearing. 3 units. *Casseday*

289S. Psychology of Prevention. Concepts of prevention and mental health promotion; community psychology and social systems; epidemiology and prediction of disorder; intervention strategies; evaluation of prevention trials; and ethical and cultural issues. 3 units. *Coie*

For Graduates

301. Group Psychotherapy and Group Influence Processes. Theories of group interventions and group techniques. 3 units. *Lakin*

302. Personality Theory. An advanced course in the representative theories of human functioning, from Freud to contemporary approaches. 3 units. *Kremen*

305. Psychopathology. An examination of behavior disorders, with particular emphasis on explanatory concepts and the evidence from research in this field. 3 units. *Carson*

307. Introduction to Theories and Methods of Mainstream Psychotherapies. Application of personality theories to therapeutic change processes. Problems of therapy case management. 3 units. *Carson or Lakin*

309. Seminar in Learning. Selected topics in operant conditioning and discrimination learning. 3 units. *Staddon*

318. Measurement and Methods. Examination of relationships among ideas, methods, and measures in psychological and social research. 3 units. *Staff*

329-330. Proseminar in Psychology. A historically oriented, team-taught course introducing graduate students to important ideas and discoveries in scientific psychology. 6 units. *Staff*

335-336. Personality Assessment. First semester: Personality assessment through interviews and the study of personal documents. Second semester: Personality assessment through the study of formal tests, objective and projective. 6 units. *Alexander*

338. Ethics for Psychotherapists. A course for graduate students in the clinical program. 1 unit. *Lakin*

343-344. Clinical Practicum. Intensive experience and supervision in clinical intervention processes. Student training in psychotherapy strategies and techniques and in clinical consultation skills is conducted in clinical settings. 6 units. *Staff*

348. Psychotherapy with Children and Families. Major theoretical approaches to clinical intervention with children and adolescents, either individually or in the family system context. 3 units. *Coie*

349-350. Practicum in Psychological Research. 6 units. *Staff*

351. Developmental Psychopathology. Consideration of major psychopathological disorders in childhood and adolescence, theories and research on etiology and prediction of disorder. 3 units. *Lochman and Thompson*

352. Child Assessment. Interview methods; intelligence and achievement testing; personality and developmental batteries; peer, teacher, and parental instruments; and observational techniques. 3 units. *Coie and Putallaz*

398. Graded Research. 1 to 3 units. *Staff*

399. Special Readings in Psychology. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

230S. Social Behavior of Animals

310. Seminar in Perception

323, 324. Seminar in Community Psychology

337. Seminar in Sensory Discrimination

353. Research Practicum in Prevention

Public Policy Studies

Professor Cook, *Director* (109C Old Chemistry); Professor Ladd, *Director of Graduate Studies* (112 Old Chemistry); Professors Ascher, Barber (political science), Clotfelter, Eddy, Fleishman (School of Law), Gillis, Horowitz (School of Law), Hough (political science), Kuniholm, Pearsall (engineering), and Price (political science); Associate Professors Behn, Lipscomb, Magat (Fuqua School of Business), McConahay, and Stack; Assistant Professors Durning, and Entman; Professors of the Practice Geller, Stubbing, and Yaggy; Lecturer Payne; Visiting Associate Professor Rapaport

The graduate program in public policy studies is offered through the Institute of Policy Sciences and Public Affairs. The objective of the program is to prepare students for jobs, particularly in the public sector, which require analytical skills and a practical understanding of the processes by which policy is made and implemented.

The A.M. degree requires two academic years and a summer internship. The first year is devoted to core courses in policy analysis, including sequences in quantitative methods, economics, political analysis, and ethics. The summer internship is arranged with a federal, state, or local agency. The second-year curriculum includes course work in public management and macroeconomics, a concentration in a substantive policy area, and a master's "memo" to be researched and written on a problem of current policy concern.

Students who are concurrently enrolled in a Ph.D. program or a professional degree program (M.D., J.D., M.B.A., M.H.A., etc.), or who have already obtained such a degree, can apply for an abbreviated version of the A.M. program. Such students are excused from most second-year requirements, so ordinarily the A.M. in public policy can be completed in one additional year. Students usually apply for a joint degree program simultaneously with their applications to the graduate departments or professional schools, or during their first or second year of advanced study.

The institute does not award a Ph.D.

More information concerning the A.M. programs can be obtained by writing the Director of Graduate Studies.

For Seniors and Graduates

204S. Ethics in Political Life. See C-L: Political Science 204S. 3 units. *Spragens*

217. Microeconomics and Public Policy Making. Consumption and production theory, welfare economics, theories of collective choice, market structures and regulation, and nonmarket decision making. (Not open to students who have taken Public Policy Studies 110.) 3 units. *Staff*

218. Macroeconomic Policy. Survey of macroeconomic theory and analysis of policies designed to reduce unemployment, stimulate economic growth, and stabilize prices. Conventional monetary and fiscal instruments, employment policies, and new policies designed to combat inflation. C-L: Economics 218. 3 units. *Staff*

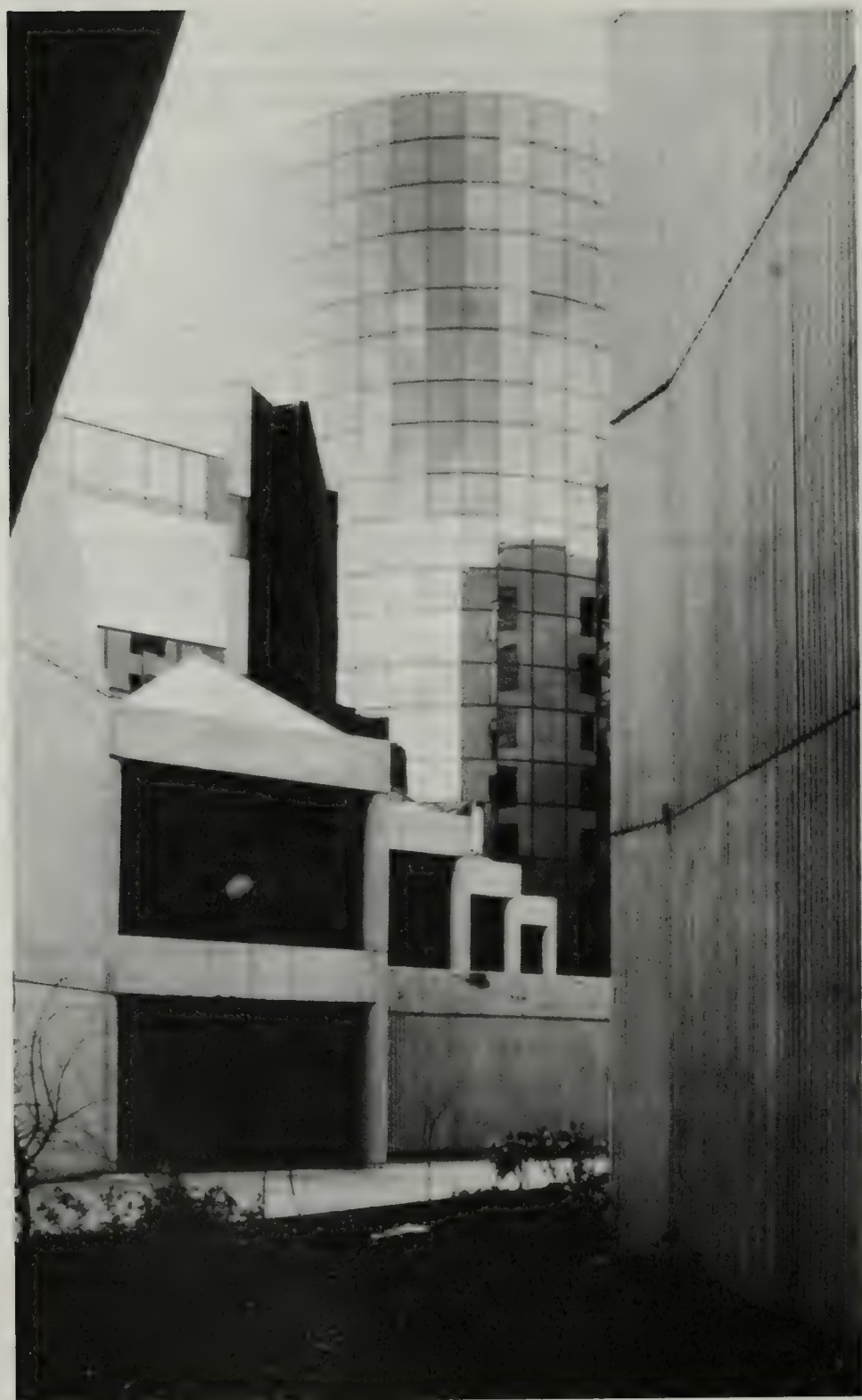
219. The Politics of the Policy Process. The formulation of public policies, substantive policies in a variety of contexts from local government to international affairs; the role of legislatures, interest groups, chief executives, and the bureaucracy in defining alternatives and in shaping policy from agenda formulation to implementation. (Not open to students who have taken Public Policy Studies 114.) C-L: Political Science 248. 3 units. *Entman*

221. Decision Analysis for Public Policy Makers. Methods for structuring decision dilemmas and decomposing complex problems, assessing the probabilities of uncertain consequences of alternative decisions, appraising the decision maker's preferences for these consequences and for re-examining the decision. (Not open to students who have taken Public Policy Studies 55.) 3 units. *Behn*

222. Data Analysis for Public Policy Makers. Sampling theory, Bayesian statistics, and regression analysis. Examples from problems in health care, transportation, crime, urban affairs, and politics. (Not open to students who have taken Public Policy Studies 112.) 3 units. *Cook or McConahay*

223. Ethics and Policy Making. Normative concepts in politics, liberty, justice, the public interest: historical and philosophical roots, relationship to one another and to American political tradition, and implications for domestic policy problems. Not open to students who have taken Public Policy Studies 116. C-L: Political Science 245. 3 units. *Rapaport*

231. Quantitative Evaluation Methods. Problems in quantifying policy target variables such as unemployment, crime, and poverty. Experimental and nonexperimental



methods for evaluating the effect of public programs, including topics in experimental design, regression analysis, and simulation. Prerequisite: Public Policy Studies 222 or equivalent. 3 units. *Cook or McConahay*

232. Microeconomics: Policy Applications. Cost benefit analysis of public programs. Public utility regulation, pollution regulation, hospital rate setting, regulation of product safety. Quantitative methods and microeconomic theory for analysis of both normative and positive aspects of economic policy. Prerequisites: Public Policy Studies 110 or 217 or Economics 149 and familiarity with regression analysis or concurrent enrollment in Public Policy Studies 231. C-L: Economics 232. 3 units. *Ladd*

236S, 237S. Public Management I and II: Managing Public Agencies. 236S: operations management, information and performance, personnel management, public sector marketing. 237S: organizational strategy, organizational structure and design, leadership and motivation, labor negotiations. Prerequisite for 237S: Public Policy Studies 236S. 3 units each. *Behn, Durning, or Yaggy*

238S. Public Budgeting and Financial Management. Fund accounting for government; techniques of financial analysis, including break-even analysis, cost accounting, cash-flow analysis, and capital budgeting; and governmental budgeting, including the budgetary process and reforms, and the budget crunch in the public sector. 3 units. *Stubbing*

240S. Analyzing the News. Research seminar on political messages and effects of media. Methods and findings of content analysis, survey research, critical theory, semiology; research project integrating these approaches. C-L: Political Science 208S. 3 units. *Entman*

241. Reporting the American People. Critical analysis of the sources of information the media rely upon in reporting opinion and policy preferences: opinion polls, bellwethers, informed elites. Includes the design and execution of a public opinion poll on a topic of local or national interest. 3 units. *McConahay*

245S. Leadership Tutorial. Analysis of techniques, personal qualities, and organizational factors that help or hinder effective leadership. Practical experience in evaluation of leadership efforts. Prerequisite: Public Policy Studies 145D or consent of instructor. 3 units. *Payne*

250S. Policy, Philanthropy, and the Arts. Democratic and aesthetic values in relation to past and present patterns of public, corporate, and philanthropic support for the arts. The uses of art criticism and political theory in evaluating subsidies, grants, tax incentives, and censorship. Prerequisite: consent of instructor. 3 units. *Payne*

254. Transportation Planning and Policy Analysis. Prerequisite or corequisite: Civil and Environmental Engineering 116 or consent of instructor. See C-L: Civil Engineering 216. 3 units. *Pas*

257. United States Policy in the Middle East. From World War II to the present with a focus on current policy options. 3 units. *Kuniholm*

264S. Research Seminar: Topics in Public Policy I. Selected topics. 3 units. *Staff*

267S. Policy Making in International Organizations. Emphasis on international financial institutions such as the World Bank and the International Monetary Fund. C-L: Political Science 267S. 3 units. *Ascher*

268. Federal Tax Policy. Structure, incidence, and economic effects of major federal taxes. Special attention to problems of inflation, income definition, distortions, savings, and investment. C-L: Economics 268. 3 units. *Clotfelter or Schmalbeck*

270S. Humanistic Perspectives on Public Policy. Modes of inquiry into aspects of social life important to policy makers but beyond the normal reach of social science. Reading from James Agee, Robert Coles, Eudora Welty, James Baldwin, George Eliot, and others. Prerequisite: consent of instructor. 3 units. *Coles and Payne*

272. Resource Economics and Policy. See C-L: Forestry and Environmental Studies 270. 4 units. *Hyde*

278. Human Service Bureaucracies. Schools, prisons, courts, welfare agencies: decision-making, implementation, the impact of work practices on clients. The future of street-level bureaucracy. 3 units. *Stack*

283S. Congressional Policy Making. See C-L: Political Science 283S. 3 units. *Price*

284S. Public Policy Process in Developing Countries. Policy-making patterns in less developed countries; examples from Latin America, Africa, and Asia. C-L: Political Science 284S. 3 units. *Ascher*

286S. Economic Policy Making in Developing Countries. Fiscal, monetary, and exchange rate policies in less developed countries; issues in public policy toward natural resources and state-owned enterprises. Prerequisite: Public Policy Studies 110 or Economics 149. C-L: Economics 286S. 3 units. *Gillis*

290. Glasgow Seminar in Public Policy. The large theoretical problems of public policy (e.g., justice, equality, liberty); the making and implementation of policy in specific areas (e.g., economic, urban, social); comparative analysis of Europe's communist countries and how their political systems differ from those of the United States and Britain. Taught in Scotland. 3 units. *Staff*

For Graduates

303. Public Policy Workshop I. Introduction to policy analysis and advising. Emphasis on written and oral communication skills, the substance of public policies, and the role of policy analysts. Open to Public Policy Studies A.M. students only. 3 units. *Behn or Durning*

304.01. Public Policy Workshop II. The role and influence of policy analysis. The examination of specific public policy cases and recommendations for action. Emphasis on written and oral communications skills. 3 units. *Behn or Durning*

305.01. Public Policy Workshop III. Emphasis on individual or group projects. Preparation for Masters Memo. Open to Public Policy Studies A.M. students only. 3 units. *Yaggy*

325S, 326S. Program in International Development Policy Sector Seminar. Exploration of the relationships among sectoral policies and sustainable development in less developed countries, with emphasis on a particular sector each year. Open only to Program in International Development Policy Fellows, or by permission of the instructor. 6 units each. *Staff*

327, 328. Program in International Development Policy Issue Seminar. Topics in the policy issues and institutional structures of sectoral policymaking in less developed countries. Open only to Program in International Development Policy Fellows, or by permission of the instructor. 6 units each. *Staff*

388. Research Tutorial in Public Policy. 3 units. *Staff*

399. Special Readings in Public Policy Studies. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

256. The Economics of Health Care

270S. Humanistic Perspectives on Public Policy

Religion

Professor Lawrence, *Acting Chairman* (117B Gray); Professor Hauerwas, *Director of Graduate Studies* (209A Divinity School); Professors D. Campbell, Clark, Crenshaw, Herzog, Kort, Langford, Lincoln, Marsden, E. Meyers, Osborn, D. M. Smith, H. Smith, Steinmetz, Via, Wainwright, and Wintermute; Associate Professors Bailey, Bland, Corless, C. Meyers, Partin, Peters, and Surin; Assistant Professors Berger, T. Campbell, Fulkerson, Martin, Robinson, and Turner; Research Professor Richey

The Department of Religion offers graduate work leading to the A.M. and Ph.D. degrees. Students may major in one of seven fields: (1) Hebrew Bible and Semitics, (2) New Testament and Christian origins, (3) history of Christianity, (4) Christian theology and ethics, (5) history of Judaism, (6) history of religions, and (7) religion, culture, and critical theory. They will be expected to take courses which will contribute to an adequate understanding of their chosen fields of specialization and will be required to take two written preliminary examinations within their field of concentration.

In addition to course work in their major field, students will take such other courses in cognate fields as will contribute to the enrichment of their major studies and will be required to take one written preliminary examination in a single cognate area within the department. A minor requirement may be fulfilled by work in a cognate department, such as classical studies, history, philosophy, political science, or sociology, and will constitute the outside minor and material for a fourth written preliminary examination. There is, in addition, an oral examination conducted by the student's committee immediately subsequent to the written examinations. There is a foreign language requirement of two languages which must be met before taking the doctoral preliminary examination.

The program of doctoral studies presumes a foundation in the academic study of religion. Students applying for graduate work in religion directly from an undergraduate program should have had a strong undergraduate major in religion, and will be accepted for the Ph.D. program only upon the satisfactory completion of the A.M. degree with the department.

The graduate program also offers an A.M. degree that is not linked to a specific Ph.D. field. Such study is intended to encourage individuals to pursue a variety of interests irrespective of whether they desire further graduate study. An A.M. concentration may be in any of the seven Ph.D. fields or in an individually designed program of study (such as Islamic studies or religion and the social sciences).

For Seniors and Graduates

200. Person and Work of Christ. The problem of knowledge of Christ and formulation of a doctrine of his work and person in the light of biblical eschatology. 3 units. *Staff*

205. War and the Christian Tradition. An analysis of how Christians have understood and evaluated war, with particular attention to the question of the moral status of war. Works by Augustine, Aquinas, Bainton, Ramsey, Childress, Niebuhr, and Johnson will be considered. 3 units. *Hauerwas*

207, 208. Intermediate Biblical Hebrew. Grammar with reading and exegesis of Old Testament prose and poetry. Prerequisite: at least one year of Hebrew or consent of instructor. C-L: Old Testament 207, 208 in the Divinity School. 6 units. *Staff*

209. Old Testament Theology. Studies of the Old Testament in regard to theological themes and content. 3 units. *Crenshaw*

213. Christian Ethics in America. Ethical thought in America since Rauschenbush. 3 units. *Hauerwas*

214. Feminist Theology. Examination of feminist theologians and religionists, their critical perspective on the Christian tradition and constructive proposals out of the resources of "female experience." 3 units. *Fulkerson*

215S. Theological Ethics. Philosophical paradigms and the nature of the Christian life. 3 units. *Hauerwas*

217. Islam in India. History and thought of major Indian Muslims from Biruni to Wali-Ullah, with special attention to the role of Sufism. An introduction to selected Muslim scholars and saints who contributed to the interaction between Islam and Hinduism in northern India during the second millennium A.D. 3 units. *Lawrence*

218. Religion in Japan. A survey of religion in Japan, with special emphasis on indigenization and attempts at synthesis. An approach to the meaning of the words *religious* and *secular* in the Japanese situation. 3 units. *Corless*

219. Augustine. The religion of the Bishop of Hippo in late antiquity. C-L: Medieval and Renaissance Studies. 3 units. *Clark*

220. Rabbinic Hebrew. Interpretive study of late Hebrew, with readings from the Mishnah and Jewish liturgy. 3 units. *E. Meyers or staff*

221. Readings in Hebrew Biblical Commentaries. Selected Hebrew texts in Midrash Aggadah and other Hebrew commentaries reflecting major trends of classical Jewish exegesis. 3 units. *Bland or staff*

222. John among the Gospels. A consideration of the character, content, and purpose of the Gospel of John in relation to the synoptic and apocryphal gospels. Prerequisite: one year of Hellenistic Greek. 3 units. *M. Smith*

223A-E. Exegesis of the Hebrew Old Testament. 3 units each.

A. Pentateuch. *Staff*

B. Historical Books. *Staff*

C. Major Prophets. *Staff*

D. Minor Prophets. *Staff*

E. Writings. *Staff*

225. Living Issues in New Testament Theology. Critical examination of major problems and issues in New Testament interpretation and theology. 3 units. *Via*

226A-F. Exegesis of the Greek New Testament I. 3 units each.

A. Matthew. *Via*

B. Romans. *Staff*

C. Mark. *Via*

E. The Gospel and Epistles of John. *D. M. Smith*

F. I and II Corinthians. *D. M. Smith*

227A-E. Exegesis of the Greek New Testament II. 3 units each.

A. Luke. *Staff*

B. Galatians. *D. M. Smith*

C. The Pastoral Epistles. *Staff*

D. Epistles of Peter and James. *Staff*

E. Acts. *M. Smith*

228. Twentieth-Century Continental Theology. An investigation of leading theologians and theological trends. 3 units. *Osborn*

230S. The Meaning of Religious Language. An analysis of the credentials of some typical claims of theism in the light of theories of meaning in recent thought. C-L: Philosophy 230S. 3 units. *Staff*

232S. Religion and Literature. Theories concerning the relation of religion to literary forms, particularly narrative. 3 units. *Kort*

233. Modern Narratives and Religious Meanings. A study of kinds of religious meaning or significance in representative American, British, and Continental fiction of the first half of the twentieth century. 3 units. *Kort*

234. Early Christian Asceticism. The development of asceticism and monasticism in the first six centuries of Christianity. C-L: Women's Studies. 3 units. *Clark*

235. Heresy: Theological and Social Dimensions of Early Christian Dissent. 3 units. *Clark*

236. Luther and the Reformation in Germany. The theology of Martin Luther in the context of competing visions of reform. C-L: Medieval and Renaissance Studies. 3 units. *Steinmetz*

237. History of the Ancient Near East. Emphasis upon the religions, literature, and art of Mesopotamia. 3 units. *Bailey*

238. Jewish Responses to Christianity. Apologetic and polemical themes in rabbinic, medieval, and contemporary writings. 3 units. *Bland*

239. Introduction to Middle Egyptian I. Grammar and readings in hieroglyphic texts relating to the Old Testament. 3 units. *Wintermute*

240. Introduction to Middle Egyptian II. Readings in Middle Egyptian and introduction to New Egyptian Grammar. Prerequisite: Religion 239. 3 units. *Wintermute*

242. Life after Death in Semitic Thought. Consideration of the various ideas from the early second millennium through the intertestamental period. Exegesis of selected Old Testament passages. Evaluation of recent research. Knowledge of Hebrew helpful but not required. 3 units. *Bailey*

243. Archaeology of Palestine in Biblical Times. Investigation of selected material remains from the Bronze Age to the Persian period. Trends in biblical studies, with particular attention to methodological considerations and current developments. 3 units. *C. Meyers*

244. The Archaeology of Palestine in Hellenistic-Roman Times. The study of material and epigraphic remains as they relate to Judaism in Hellenistic-Roman times, with special emphasis on Jewish art. 3 units. *C. Meyers or E. Meyers*

245. Ethics in World Religions. Moral foundations, assumptions, and applications in such major faiths as Hinduism, Buddhism, Confucianism, and Islam, in the light of Christian ethical perspectives. 3 units. *Staff*

246. Problems in Historical Theology. Prerequisite: consent of instructor. 3 units. *Staff*

248. The Theology of Karl Barth. A historical and critical study of the theology of Karl Barth. Prerequisite: consent of instructor. 3 units. *Osborn*

249. The Lord's Prayer. Introduction to God, man, prayer, and kingdom through historical and contemporary expositions of the Lord's Prayer. 3 units. *Wainwright*

257. New Testament Ethics. Scope and basic problems of New Testament ethics; consideration of two important New Testament books. Problems and issues such as the role of the law, symbolic language in ethical discourse, conscience, homosexuality, the state, and self deception. 3 units. *Via*

258. Coptic. Introduction to the Sahidic dialect with selected readings from Christian and Gnostic texts. Prerequisite: at least one year of Greek. 3 units. *Wintermute*

259. Icon Theology. A study of theological controversies surrounding the use of images in Christian worship, followed by an attempt to perceive the symbolic conventions and doctrinal content of some Eastern, Western, and contemporary icons. 3 units. *Wainwright*

260. Life and Thought of the Wesleys. A seminar on John and Charles Wesley and their colleagues in relation to English culture and religion in the eighteenth century. 3 units. *T. Campbell*

262. Marxist Ideology and Christian Faith. Comparative examination of Communist and Christian doctrines concerning humans, society, sin, history, and eschatology, together with an introduction to the contemporary dialogue. 3 units. *Staff*

263. Third World Theology. An examination of selected theological writings from Asia, Africa, and Latin America, comparing their perspectives and their unique contributions with contemporary Christian thought. 3 units. *Lacy*

264. The Sociology of the Black Church. An effort to identify, define, describe, and interpret the black church. 3 units. *Lincoln*

265. The Religions of the West Africa Diaspora. Religious development of Africans displaced to the Western Hemisphere by slavery. 3 units. *Lincoln*

266. Ethics and Health Care. 3 units. *H. Smith*

267. American Puritan Thought through Edwards. Study of some of the classic investigations of American Puritan thought, culminating with a more intensive look at literature by and about Jonathan Edwards. 3 units. *Marsden*

268. Revelation and Authority in the Church. A critical and constructive examination of contemporary concepts. 3 units. *H. Smith*

269. Feminist Theory and the Humanities. C-L: English 283 and Women's Studies. 3 units. *Clark, Orr, Pope, or Tompkins*

270. American Evangelism and Fundamentalism. A study of some of the major themes in the development of transdenominational evangelicalism and fundamentalism in America from the eighteenth century to the present. This will be a reading seminar involving analyses and discussions of literature (mostly secondary works) important for understanding American evangelicalism as a distinct movement. 3 units. *Marsden*

279. Understandings of the Resurrection in Contemporary Thought. Recent literature on the resurrection of Jesus Christ from the perspectives of exegesis, historical criticism, hermeneutics, and systematic significance. 3 units. *Wainwright*

280. The History of the History of Religions. The origin and history of the comparative study of religion, with particular attention to its methodology. 3 units. *Partin*

282. Myth and Ritual. Myths, rites, and symbols as modes of religious expression. Interpretation of symbolic configurations of kingship, initiation, sacrifice, and pilgrimage in diverse cultural contexts. 3 units. *Robinson and staff*

283. Islam and Modernism. Cultural, religious, and ideological forces which shape Muslim responses to modernism. 3 units. *Lawrence*

284. The Religion and History of Islam. Origins and development of the Islamic community and tradition, with particular attention to the religious element. 3 units. *Partin*

285. Introduction to the History of Religions. The history, symbols, rites, and structures of the manifestations of the sacred in the major religious traditions of the world. 3 units. *Staff*

287. The Scriptures of Asia. Translations of basic texts from the religious traditions of India, China, and Japan. 3 units. *Staff*

288. Buddhist Thought and Practice. A historical introduction to Buddhist thought and practice, with special attention to their interrelationship in the living religion. 3 units. *Corless*

289. Theology and Contemporary Secular Understandings of Human Nature. Critical theological examination of selected current interpretations of human nature and the human situation. 3 units. *Langford*

292. Happiness, Virtue, and Friendship. Issues of their relationship in moral philosophy. 3 units. *Hauerwas*

293. Religious Issues in American History. A reading seminar devoted to selected topics, problems, and issues in American religion. 3 units. *Richey*

294. Christianity and the State. The relation of the Christian theory of the state to political problems, with special consideration of the religious assumptions underlying democratic theory and practice and of the relationship of church to state. 3 units. *Staff*

295. Religion in the American South. A study of the interrelationships of Southern religion and Southern culture. 3 units. *Marsden*

For Graduates

300. Systematic Theology. Method and structure of systematic theology, the doctrine of God, theological anthropology, and Christology. 3 units. *Herzog*

302. Studies in the Intertestamental Literature. Selected documents of the Apocrypha and Pseudepigrapha examined exegetically and theologically in their relation to postexilic Judaism. Prerequisite: consent of instructor. 3 units. *Staff*

304. Aramaic. A study of the Aramaic portions of the Old Testament and selected passages from the Elephantine and Qumran texts. 3 units. *E. Meyers or Wintermute*

304A. Targumic Aramaic. An introduction to the language and literature of the Aramaic translations of the Old Testament. 3 units. *Meyers*

305. The Septuagint. A study of the modern critical use of the Greek Old Testament. Prerequisites: knowledge of Greek and Hebrew. 3 units. *Peters*

306. Language and Literature of the Dead Sea Scrolls. A study in interpretation. Prerequisite: a knowledge of Hebrew. 3 units. *Staff*

307. Syriac. A study of the script and grammar, with readings from the Syriac New Testament and other early Christian documents. Prerequisite: some knowledge of Hebrew and Aramaic. 3 units. *Staff*

309. Hermeneutics. Consideration of the nature of understanding and of several interpretive methods—such as phenomenological, existential, historical, literary, structural—along with their application to New Testament texts, primarily the parables of Jesus. 3 units. *Via*

310. Readings in Judaica. Selected studies in Jewish material culture and problems in Jewish religious and intellectual history. 3 units. *Bland, E. Meyers, and staff*

316S. History of Religions. Selected problems in the field. 3 units. *Staff*

318. Seminar in the Greek Fathers. A study of selected topics from the Greek Fathers. 3 units. *Staff*

322. Nineteenth-Century European Theology. Protestant theology from Kant to Herrmann. 3 units. *Herzog*

323A. Comparative Semitic I. An introduction to the morphology and syntax of classical Ethiopic and the Semitic languages of Mesopotamia, together with a consideration of their relationship to Hebrew. 3 units. *Wintermute*

323B. Comparative Semitic II. An introduction to the morphology and syntax of classical Arabic and the Semitic languages of Palestine-Syria, together with a consideration of their relationship to Hebrew. 3 units. *Wintermute*

325. Philosophical Theology I. Theology, as the knowledge of God, considered in dialogue with selected pagan and Christian philosophers from Plato to Kant. 3 units. *Staff*

326. Philosophical Theology II. Continuation of Philosophical Theology I. 3 units. *Langford*

329. Readings in Theology and Language. Sample treatments of religious language in linguistic analysis, hermeneutical theory, literary criticism, liturgical practice, and fundamental theology. 3 units. *Wainwright*

330. Contemporary Christologies. A seminar dealing with contemporary Roman Catholic and Protestant Christology. Readings and discussion will focus on theological proposals from major contemporary figures. 3 units. *Wainwright*

331. Eschatology. A study of issues in individual, communal, and universal eschatology against the background of twentieth-century scholarly work on the kingdom of God. 3 units. *Wainwright*

332. System in Theology. An examination of the various factors that go into the shaping of a systematic theology, followed by a study of several recent and contemporary examples of the genre. 3 units. *Wainwright*

333. The Doctrine of the Trinity. Biblical bases, patristic developments, contemporary statements and connections. 3 units. *Wainwright*

334. Theology and Reform in the Later Middle Ages. The life and thought of the medieval church from the twelfth century through the fifteenth. Popular and academic theologians from Pierre Abelard to Gabriel Biel. 3 units. *Steinmetz*

335. The English Church in the Eighteenth Century. Studies of Christianity in England from the Act of Toleration, 1689, to the death of John Wesley, 1791. 3 units. *T. Campbell*

337. Theology of St. Thomas Aquinas. Intensive reading of the *Summa Theologica* and biblical commentaries. 3 units. *Staff*

338. Calvin and the Reformed Tradition. The theological development of John Calvin. A comprehensive examination of his mature position with constant reference to the theology of other reformers. C- L: Medieval and Renaissance Studies. 3 units. *Steinmetz*

339. The Radical Reformation. Protestant movements of dissent in the 16th century. Special attention will be devoted to Müntzer, Carlstadt, Hubmaier, Schwenckfeld, Denck, Marpeck, Socinus, and Menno Simons. 3 units. *Steinmetz*

340, 341. Seminar in the New Testament. Research and discussion on a selected problem in the biblical field. Spring only. 3 units each. *Staff*

342. American Religious Biography. A study of the leading biographies of American religious figures and of the qualities of a successful biography. 3 units. *Marsden*

343. Readings in Ancient Near Eastern Wisdom Literature. A survey of the principal Egyptian and Mesopotamian works that relate to biblical wisdom. 3 units. *Staff*

346. Practical Reason and Personal Identity: Explorations in Narrative. This course will deal with questions of the nature of rationality in morality and theology and attend

particularly to those suggestions about narrative as the form of such rationality. The readings will involve works by Frei, Ricoeur, Goldberg, MacIntyre, and McClendon, as well as work in literary criticism. 3 units. *Hauerwas*

350, 351. Old Testament Seminar. Research and discussion on selected problems in the Old Testament and related fields. Fall only. 3 units each. *Staff*

352. Seminar in Christian Theology. Research and discussion of a selected problem in the systematic field. 3 units. *Staff*

353. Seminar on Text Criticism. Emphasis upon transmission, versions, apparatus, and method. Prerequisite: reading knowledge of Hebrew and Greek. 3 units. *Bailey*

360. Special Problems in Religion and Culture. Intensive investigation of the relations of religion and modernity, using seminal contemporary texts. Topics announced each semester. Prerequisite: consent of instructor. 3 units. *Poteat*

362. Readings in Old Testament and Semitic Studies. Selected studies in the Hebrew Bible and the languages and literatures of the ancient Near East. 3 units. *Staff*

363. Readings in New Testament and Christian Origins. Selected studies on a theme in modern New Testament scholarship. 3 units. *Staff*

364. Readings in History of Christianity. Selected issues in the social, material, and intellectual history of Christianity. 3 units. *Staff*

365. Readings in Christian Theology and Ethics. An examination of selected topics of historical and contemporary interest in these fields. 3 units. *Staff*

366. Readings in History of Religions. Selected studies in cross-cultural and intercreedal material, together with assessment of the problems they pose for the study of religion. 3 units. *Staff*

367. Readings in Religion and Culture. Analysis and discussion of theories and of individual research projects. 3 units. *Staff*

373-374. Elementary Akkadian. Study of the elements of Akkadian grammar. Reading of neo-Assyrian texts shedding light on the Old Testament. Prerequisite: biblical Hebrew. 6 units. *Bailey*

380. Existentialist Thought. An exploration of the interests and motifs of existentialism in relation to modern philosophy and theology through an analysis of representative writings of Kierkegaard, Heidegger, Berdyaev, Marcel, and Sartre. 3 units. *Poteat*

383. Moral Theology in the Twentieth Century. Critical and comparative examination of ethical theory as exhibited in the work of selected contemporary theologians. 3 units. *H. Smith*

386. Christianity in Dialogue with Other Faiths. Contemporary currents of Christian thought as they affect resurgent non-Christian faiths, new formulations of a theology of mission, and ecumenical conversations. 3 units. *Lacy*

387. Ethical Method. Selected methodological issues in contemporary theological ethics. 3 units. *H. Smith*

389. Christian Ethics and Contemporary Culture. A study of the interaction between Christian thought and current social theory. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

204. Origen

206. Christian Mysticism in the Middle Ages

- 210. Contemporary British Theology
- 231S. Seminar in Religion and Contemporary Thought
- 241. Problems in Reformation Theology
- 247. Readings in Latin Theological Literature
- 251. Counter-Reformation and Development of Catholic Dogma
- 252. Nineteenth- and Twentieth-Century Roman Catholic Theology
- 256. John Wesley in Controversial and Ecumenical Theology
- 281. Phenomenology and Religion
- 290. Current Problems in Christian Social Ethics
- 291. Historical Forms of Protestant Ethics
- 301. Seminar in Contemporary Christian Ethics
- 308. Greek Patristic Texts
- 311. Pharisaic Judaism in the First Century
- 312. Pauline Theology
- 313. The Apostolic Fathers
- 314. Judaism and Christianity in the New Testament
- 317. Seminar in the Greek Apologists
- 319. The Gospel According to Saint Matthew in Recent Research
- 320. Theology, Power, and Justice
- 324. Readings in the History of Religion
- 327. Philosophical Method in Religious Studies
- 328. Twentieth-Century European Theology
- 344. Zwingli and the Origins of Reformed Theology
- 384. Religious Dissent in American Culture
- 385. Religion in American Literature
- 388. Ethics and Medicine
- 395. Christian Thought in Colonial America
- 396. Liberal Traditions in American Theology
- 397. Contemporary American Theology
- 398. Colloquium on the Teaching of Religion
- 401. Colloquium on Biblical Studies

Romance Languages

Professor Fein, *Chairman* (205 Languages); Professor Pérez Firmat, *Director of Graduate Studies* (214 Languages); Professors Garci-Gómez, Jameson, Osuna, Stewart, Tetel, Thomas, and Wardropper; Associate Professors Caserta, Hull, Kaplan, and Orr; Assistant Professors Bell, Finucci, Ross, Sieburth, and Solterer; Visiting Professor Dorfman; Lecturer Tufts

The Department of Romance Languages offers graduate work leading to the A.M. and Ph.D. degrees in French and Spanish. Requirements for the A.M. may be completed by submission of a thesis or by passing a comprehensive examination in the major field. Related work for the A.M. and Ph.D. degrees is required in a second Romance language or in any one or two of a number of other subject areas. A reading knowledge of one foreign language which is outside the major language is required.

In order to undertake graduate study in Romance languages, the entering student should have credit for at least 18 semester hours (or equivalent) above the intermediate level in the major language.

FRENCH

For Seniors and Graduates

200S. Seminar in French Literature. Topics to be announced. 3 units. *Staff*

210. The Structure of French. Modern French phonology, morphology, and syntax. Readings in current linguistic theory. 3 units. *Hull*

211. History of the French Language. The evolution of French from Latin to its present form; internal developments and external influences. C-L: Medieval and Renaissance Studies. 3 units. *Hull*

223. Semiotics for Literature. A study of theoretical writings in general semiotics by Frege, Peirce, Saussure, Mukarovsky, Morris, and their applications for textual analysis of French literary works by representative contemporary critics such as Eco, Riffaterre, Corti, and Greimas. In English. 3 units. *Thomas*

248. French Literature of the Seventeenth Century. The baroque and the classical: form and meaning in the plays of Corneille, Racine, and Molière. Readings in baroque and précieux poetry. C-L: Medieval and Renaissance Studies. 3 units. *Staff*

251, 252. Literature of the Eighteenth Century. Problems of literary history, critical reading, and interpretation, focused on varying topics. 6 units. *Stewart*

255. French Preromantic and Romantic Poetry. Chénier, Vigny, Lamartine, Musset, Hugo, and Nerval. 3 units. *Orr*

256. Modern Literature and History. The problems of history, society, and politics in literature, through the writings of Rousseau, Tocqueville, Michelet, Flaubert, Hugo, Merleau-Ponty, Foucault, and others. 3 units. *Orr*

257. Problems of Identity in the Nineteenth-Century Novel. Romanticism and romantic realism, studied especially in the works of Chateaubriand, Stendhal, Constant, de Stäel, and Sand. 3 units. *Bell, Jameson, or Orr*

258. The Narrative of Social Crisis. Realism and naturalism, with special emphasis on Balzac, Flaubert, and Zola. 3 units. *Bell, Jameson, or Orr*

261. French Symbolism. Poetry and theories of Baudelaire, Mallarmé, and Rimbaud. Decadence: Lautréamont and Laforgue. 3 units. *Thomas*

263. Contemporary French Theater. Dramatic theory; the art of the leading directors; the major texts of Claudel, Anouilh, Sartre, Beckett, Ionesco, Genet, Adamov, Arrabal, and Rezvani. 3 units. *Orr or Thomas*

264. Contemporary French Poetry. The language of poetry. A chronological and theoretical approach to the major poets and movements since 1950. Selections from Bonnefoy, Char, Daive, Deguy, Dupin, Jabès, Jaccottet, Faye, Guillevic, Michaux, Meschonnic, Noël, Oulipo, Ponge, Stefan, Tortel, and others. 3 units. *Orr or Thomas*

265. French Literature of the Early Twentieth Century. Emphasis on Gide, Mauriac, Proust, and Colette. 3 units. *Kaplan*

266. French Literature of the Mid-Twentieth Century. Emphasis on Malraux, Sartre, Camus, and the *nouveau roman*. 3 units. *Jameson*

267. Contemporary French Novel. A chronological and theoretical approach to the major writers and movements since 1970. Selections from Duras, LeClézio, Sallenave, Modiano, Sollers, Tournier, Oulipo, Yourcenar, and others. 3 units. *Kaplan, Orr, or Thomas*

290S. Studies in a Contemporary Figure. A writer, philosopher, critic, or artist. 3 units. *Staff*

For Graduates

325. French Prose of the Sixteenth Century. Rabelais, Marguerite de Navarre, Montaigne, and others. C-L: Medieval and Renaissance Studies. 3 units. *Tetel*

326. Topics in Renaissance Poetry. C-L: Medieval and Renaissance Studies. 3 units. *Tetel*

391, 392. French Seminar. 3 units. *Bell, Jameson, Orr, Stewart, Tetel, and Thomas*

Graduate Reading Course. An intensive course in French to develop rapidly the ability to read French in several fields. Graduate students only. No credit.

ITALIAN

For Seniors and Graduates

283. Italian Novel of the Novecento. Representative novelists from Svevo to the most recent writers. 3 units. *Caserta*

284. Dante. *La Vita Nuova* and a close reading of the *Inferno*. Conducted in English. C-L: Medieval and Renaissance Studies. 3 units. *Caserta*

285. Dante. The *Purgatorio* and the *Paradiso* in the light of Dante's cultural world. Special attention will be given to the poetic significance of the *Commedia*. Prerequisite: Italian 284 or equivalent. C-L: Medieval and Renaissance Studies. 3 units. *Caserta*

SPANISH

For Seniors and Graduates

200S. Seminar in Spanish Literature. Topics to be announced. 3 units. *Staff*

210. History of the Spanish Language. Formation and development of Spanish: internal forces and external contributions. C-L: Medieval and Renaissance Studies. 3 units. *Garci-Gómez*

241. Colonial Prose of Spanish America. Narrative forms written in Spanish America during the sixteenth, seventeenth, and eighteenth centuries. 3 units. *Ross*

242. Colonial Poetry and Theater of Spanish America. The expression of Renaissance and baroque styles in the Hispanic New World, including works of Sor Juana, Ruiz de Alarcón, Ercilla, and others. 3 units. *Ross*

245. Modern Spanish-American Poetry. From *modernismo* to the present. 3 units. *Fein*

246. Modern Spanish-American Fiction. Twentieth-century novels and short stories by Borges, Carpentier, Cortázar, Gallegos, García Márquez, Quiroga, and others. 3 units. *Pérez Firmat*

248. Studies in Spanish-American Literature. Concentration on single authors, genres, movements, or themes. 3 units. *Dorfman and staff*

251. The Origins of Spanish Prose Fiction. Selected examples of the romance and the novel: *Amadís de Gaula*, Diego de San Pedro's *La Cárcel de amor*, the *Abencerraje*, the *Lazarillo*, Montemajor's *Diana*. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

253. Cervantes. The life and works of Cervantes, with special emphasis on his *Quijote*. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

254. Drama of the Golden Age. The chief Spanish dramatists of the seventeenth century with readings of representative plays of this period. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

258S. Spanish Lyric Poetry before 1700. A critical study, based on close reading and discussion, of selected poems of the Middle Ages, Renaissance, and baroque. Special emphasis on the *Razón de amor*, *la Poesía de tipo tradicional*, and Santillana; on Garcilaso, San Juan de la Cruz, Fray Luis de León, and Herrera; on Góngora and Quevedo. C-L: Medieval and Renaissance Studies. 3 units. *Wardropper*

262. The Romantic Movement. Principal manifestations of romanticism in Hispanic literature; poetry (Bécquer, Espronceda, Rosalía de Castro), drama (Rivas, Zorrilla), and the novel (Issacs, Mármol). 3 units. *Pérez Firmat or Sieburth*

275. Modern Spanish Poetry. Juan Ramón Jiménez, Unamuno, Antonio Machado, the Generation of 1927, and the contemporary poets. 3 units. *Osuna or Pérez Firmat*

276. Modern Spanish Drama. The theater of Benavente, Valle-Inclán, Lorca, Casona, Buero Vallejo, Sastre, and Arrabal. 3 units. *Osuna*

277. Modern Spanish Novel. From the Generation of 1898 to the present. 3 units. *Osuna or Pérez Firmat*

For Graduates

391, 392. Hispanic Seminar. Each semester one of the following topics will be selected for intensive treatment: the Spanish language in America, studies in medieval literature, studies in the literature of the Golden Age, studies in Latin American literature, studies in the Spanish Renaissance and baroque, studies in Spanish poetry, studies in nineteenth-century Spanish literature, and studies in twentieth-century literature. C-L: Medieval and Renaissance Studies. 6 units. *Staff*

ROMANCE LANGUAGES

218. The Teaching of Romance Languages. Evaluation of objectives and methods; practical problems of language teaching at the elementary, secondary, and college levels; analysis of textbooks, texts, and audiovisual aids; applied linguistics. 3 units. *Hull*

310. Computers for the Humanities. Applications of computers in three major humanistic areas: (a) textual research—concordances, stylistic analysis, critical editing; (b) text processing; and (c) computer-assisted or computer-managed instruction in the humanistic disciplines. No prior training in computing is required. Theoretical lectures and programming practicum. 3 units. *Thomas*

Slavic Languages and Literatures

Professor Krynski (314 Languages); Associate Professor Emeritus Jezierski

The Department of Slavic Languages and Literatures offers graduate courses in Russian language and literature and limited training in the language and literature of Poland.

Students should have sufficient preparation in the Russian language to enable them to read Russian classical literature in the original. Any presently unscheduled course will be taught in any semester upon request.

For Seniors and Graduates

201, 202. Russian Novel of the Nineteenth Century. 201: 1830 to 1870. 202: 1870 to 1900. Prerequisites: Russian 161 and 162 or equivalents. 6 units. *Staff*

225. Tolstoy. *War and Peace* and other works. Prerequisite: Russian 175S or equivalent. 3 units. *Staff*

232. Dostoevsky. Emphasis on *Brothers Karamazov* and the theory of the novel. Prerequisite: Russian 176 or equivalent. 3 units. *Staff*

COURSES CURRENTLY UNSCHEDULED

207. Soviet Literature and Culture

230. Chekhov

Sociology

Professor Land, *Chairman* (268 Sociology-Psychology); Professor Smith, *Director of Graduate Studies* (332 Sociology-Psychology); Professors Back, George, Kerckhoff, Maddox, Myers, Palmore, Simpson, and Tiryakian; Associate Professors Gereffi, O'Rand, Spenner, and Wilson; Research Professor Manton; Professors Emeriti McKinney and Preiss

The department offers graduate work leading to the A.M. and Ph.D. degrees in sociology. Students beginning work toward an advanced degree should have completed a minimum of 12 semester hours of acceptable courses in sociology and an additional 12 semester hours in related work (e.g., other social sciences, statistics, computer science, philosophy, mathematics). Accepted applicants who have not had such preparation may be required to take work beyond the usual requirements. Applicants for admission are required to take the verbal and quantitative aptitude tests of the Graduate Record Examination.

The Ph.D. program requires the student to take three core courses (Sociology 206, 207, 208) and a major and a minor specialization. Specializations (with the associated proseminars indicated in parentheses) include Life Course and Aging Studies (Sociology 221); Comparative and Historical Sociology (Sociology 222); Criminology, Criminal Justice, and the Sociology of Law (Sociology 223); Demography, Ecology, and Social Epidemiology (Sociology 224); and Organizations, Markets, and Work (Sociology 225). Requirements for major specialties vary between five and seven courses. Minor specialties require three or more courses. Including the two courses outside the department required by the Graduate School, a student entering with only an undergraduate degree and adequate course preparation would need to take a minimum of from thirteen to fifteen courses to satisfy degree requirements. Up to fifteen credits, the equivalent of five courses, may be transferred for graduate work taken elsewhere, with requirements adjusted as appropriate.

There is a qualifying procedure after three semesters, or the equivalent, to determine whether the student can proceed to the preliminary examination. The latter consists of a single four hour written examination covering both the student's chosen major and minor specializations and a two hour oral examination covering these areas plus the core material. Further details concerning the general departmental program, the specialties and their requirements, departmental facilities, the faculty, ongoing research, and stipends available may be obtained from the Director of Graduate Studies.

For Seniors and Graduates

206. Sociological Theory. Structure, foundations, and historical antecedents of recent formulations of such theoretical approaches as phenomenological sociology, exchange theory, critical theory, structuralism, neo-Marxist sociology, sociobiology, and action theory. 3 units. *Tiryakian or Wilson*

207. Social Statistics I: Basic Concepts and Methods. Review of descriptive statistics; probability concepts; statistical inference, t-tests and the analysis of variance. Bivariate correlation and regression, dummy variables, multiple regression, and the analysis of covariance. Stress on applications. Statistical computing using SPSS and other programs. 3 units. *Land or Spenner*

208. Survey Research Methods. Theory and application of survey research techniques in the social sciences. Sampling, measurement, questionnaire construction and distribution, pretesting and post-testing, response effects, validity and reliability, scaling of data, data reduction and analysis. Prerequisite: Sociology 207 or the equivalent. 3 units. *Back, Kerckhoff, or Smith*

211A-E. Proseminars in Sociological Theory. Development of sociological thought, systematic sociological theory, interrelations with other social and behavioral sciences. 3 units. *Tiryakian or Wilson*

- A. Background of Sociology
- B. Formal Aspects of Theory
- C. Sociology of Knowledge
- D. Evolutionary Theory and Sociobiology
- E. Special Topics in Sociological Theory

212. Social Statistics II: Linear Models, Path Analysis, and Structural Equation Systems. Model specification, review of simple regression, the Gauss-Markov theorem, multiple regression in matrix form, ordinary and generalized least squares, residual and influence analysis. Path analysis, recursive and nonrecursive structural equation models; measurement errors and unobserved variables. Application of statistical computing packages. Prerequisite: Sociology 207 or equivalent. 3 units. *Land or Spenner*

213. Social Statistics III: Discrete Multivariate Models. Assumptions, estimation, testing, and parameter interpretation for the log-linear, logit, logistic, and probit models. Model comparisons, application of statistical computing packages and programs. Prerequisite: Sociology 212 or equivalent. 3 units. *Land or Spenner*

214. Comparative and Historical Methods. Scope, methods, and controversies of comparative and historical sociology. 3 units. *Gereffi, Smith, or Tiryakian*

215. Basic Demographic Methods and Materials. Population composition, change, and distribution. Methods of standardizing and decomposing rates, life tables and population models, analysis of data from advanced and developing countries. Applications of computer programs for demographic analysis. Prerequisite: Sociology 207 or equivalent. 3 units. *Myers*

216. Advanced Methods of Demographic Analysis. Theory and estimation methods for life tables. Reproductivity, the stable population model. Graduation, interpolation, and other data adjustments for faulty data. Hazards models. Prerequisite: Sociology 215 or equivalent. 3 units. *Land*

217A-F. Proseminars in Social Statistics and Research Methods. Selected topics in the collection and analysis of social science data. 3 units. *Back, Gereffi, Land, Manton, Myers, Smith, Spenner, or Tiryakian*

- A. Discrete and Continuous Models of Measurement
- B. Hazards Models, Event History Analysis, and Panel Data
- C. Dynamic Model and Times Series Analysis
- D. Research Design
- E. Evaluation Research Methods
- F. Special Topics in Social Statistics and Research Methods

221A-D. Proseminars in Aging and Life Course Analysis. Selected topics in socialization, human development, status attainment and careers, and the sociology of aging. 3 units. *Back, George, Kerckhoff, Land, Maddox, Manton, Myers, O'Rand, Palmore, or Spenner*

- A. Social Structure and the Life Course
- B. Social Patterns of Personal Development
- C. Social Gerontology
- D. Special Topics in Aging and Life Course Analysis

222A-D. Proseminars in Comparative and Historical Sociology. Selected topics in the differentiation and transformation of societies. 3 units. *Gereffi, Kerckhoff, Maddox, Myers, Simpson, Smith, or Tiryakian*

- A. Theories of Social Change
- B. Comparative Aspects of Societal Transformation
- C. Theories of Change in Third World
- D. Special Topics in Comparative and Historical Sociology

223A-E. Proseminars in Criminology, Criminal Justice, and the Sociology of Law. Selected topics in crime and the institutions of social control. 3 units. *Land, Simpson, Tiryakian, or Wilson*

- A. Theories of Crime Causation
- B. Human Development and Criminal Careers
- C. Social Control and the Criminal Justice System
- D. Sociology of Law
- E. Special Topics in Criminology, Criminal Justice, and the Sociology of Law

224A-F. Proseminars in Demography, Human Ecology, and Social Epidemiology. Selected topics in population studies. 3 units. *Back, Land, Maddox, Manton, Myers, or Smith*

- A. Population Dynamics
- B. Mortality and Morbidity
- C. Urbanization and Migration
- D. Social Epidemiology
- E. Population and Health Care Systems
- F. Special Topics in Demography, Human Ecology, and Social Epidemiology

225A-E. Proseminars in Organization, Markets, and Work. Selected topics in complex organizations, the labor process, and changing occupations. 3 units. *Gereffi, Kerckhoff, Land, Maddox, O'Rand, Simpson, Smith, Spenner, or Wilson*

- A. Organizations and Environments
- B. The Social Psychology of Organizations
- C. Markets and Market Behavior
- D. Careers and Labor Markets
- E. Special Topics in Organizations, Markets, and Work

226A-H. Proseminars in Social Institutions and Processes. Selected topics in the sociology of institutions and social and institutional behavior. 3 units. *Back, George, Kerckhoff, Maddox, O'Rand, Smith, Spenner, Tiryakian, or Wilson*

- A. Social Psychology
- B. Social Stratification
- C. Political Sociology
- D. Sociology of Religion

- E. Sociology of Science
- F. Sociology of Education
- G. Medical Sociology
- H. Special Topics in Social Institutions and Processes

234S. Political Economy of Development: Theories of Change in the Third World.

See C-L: Political Science 234S; also C-L: Anthropology 234S and History 234S. 3 units. *Bergquist, Fox, Gereffi, or C. Smith*

255. Political Sociology. Pluralist, elite, and class theories of the relationship between state and society. Topics include: recent debates on the welfare state, social control, political participation, and state-society relations in socialist economies. C-L: Political Science 255. 3 units. *Smith or Tiryakian*

282S. Canada. See C-L: Political Science 282S; also C-L: Anthropology 282S and History 282S. 3 units. *Staff and visitors*

298S, 299S. Seminar in Selected Topics. Substantive, theoretical, or methodological topics. 3 units each. *Staff*

For Graduates

392. Individual Research in Sociology. Students will conduct on an individual basis research designed to evaluate a sociological hypothesis of their choice. The process must be completed by preparation of a report on this research in adequate professional style. Prerequisite: Sociology 207, 208 or consent of instructor. 3 units. *Staff*

The University Program in Toxicology

Professor Graham, *Director* (M255 Davison Building); Professor Abou-Donia, *Deputy Director* (020 Research Park IV); James B. Duke Professor Fridovich, *Deputy Director* (231 Nanaline Duke Building); Associate Professor Richardson, *Deputy Director* (004A Biological Sciences Building); Professor Adams, *Director of Graduate Studies* (M310-B Davison Building)

The University Program in Toxicology seeks to produce investigators with sound training in the scientific basis for research in toxicology who will advance the science of this discipline. After broad general courses in epidemiology and statistics, pathology, and mammalian toxicology, students will be trained in one of three tracks: (1) as generalist toxicologists, with broad training in the principles and concepts of toxicology and the design of protocols for toxicological assessments; (2) as specialist toxicologists in those areas of toxicology research in which faculty members are currently productive—in pulmonary toxicology, neurotoxicology, immunotoxicology, genetic toxicology (carcinogenesis), and biochemical toxicology; or (3) as ecotoxicologists with broad training in principles and concepts of both toxicology and ecology as they relate to the release, transport, exposure, accumulation, and effects of toxicants in the ecosystem.

The toxicology program faculty is comprised of members from the Departments of Anesthesiology, Biochemistry, Chemistry, Medicine, Microbiology and Immunology, Pathology, Pharmacology, Physiology, Zoology, the School of Forestry and Environmental Studies, and the Duke University Marine Laboratory.

Students seeking a Ph.D. in one of the participating Graduate School departments must make initial application to one of the participating departments. Students who apply initially for graduate study in one of the departments may also be nominated by that department for admission to the program. Such students should list toxicology as their "Special Field" on the application form. It is expected that most students will have a strong undergraduate preparation in mathematics and the physical and biological sciences with demonstrated excellence of performance as judged by grades in course work and letters of recommendation from former instructors.

Each student in the program will take a series of courses in toxicology as well as courses specified by his or her department. A student will be expected to choose a dissertation advisor in his or her department at least by the end of the first two semesters in the program, and will normally be expected to begin dissertation research during the third semester in residence. Upon satisfactorily completing all degree requirements in the program and in the department, students will be jointly recommended for the Ph.D. degree.

Further information may be obtained from the Director of the Toxicology Program.

Women's Studies

Jean F. O'Barr, *Director* (207 East Duke Building); Carol Meyers, *Associate Director*

The Women's Studies Program provides a focal point within the university for the study of gender. Students enrolled in any of the university's departments and professional schools may participate in the program through enrollment in the courses listed below, through specialized study in independent research with any of the fifty-four faculty members associated with the program, and through pursuing an M.A. or Ph.D. thesis topic in feminist theory. Students considering a concentration in women's studies are encouraged to consult the Director for assistance in tailoring a program of study suited to their individual professional needs.

SIGNS: Journal of Women in Culture and Society is edited at Duke. Internships and work-study positions form an important part of the graduate education of students interested in feminist scholarship.

Interdisciplinary Course 211S. History of Feminist Thought. The intellectual history of feminist thought and an analysis of the sex/gender system from medieval through modern times. Examination of classical philosophical, sociological, and literary texts. 3 units. *Neuschel, J. O'Barr, or Pope*

Interdisciplinary Course 283S. Feminist Theory and the Humanities. Beliefs about gender in the assumptions, methods, and central issues, as well as the principal subject matter, of mainstream scholarship in traditional humanities disciplines. Consideration will be given to the way particular social and institutional circumstances linked to gender distinctions have, historically, lent the disciplines their particular character and traditional concerns. 3 units. C-L: English 283 and Religion 269. *Clark, Orr, Pope, or Tompkins*

Interdisciplinary Course 284S. Feminist Theory and the Social Sciences. Examination of feminist modes of inquiry in the social sciences. The relationship of gender in economic, political, social, and cultural systems and the resulting methodological shifts in social science disciplines. C-L: History 284. 3 units. *Chafe, Neuschel, O'Rand, C. Smith, or Spenner*

COURSES ON WOMEN OFFERED BY DEPARTMENTS

Anthropology 215S. The Anthropology of Women: Theoretical Issues. *Staff*
Anthropology 251S. American Marriage: A Cultural Approach. *Quinn*
Anthropology 272S. Marxism and Feminism. *Smith*
Christian Theology 214. Feminist Theology. *McClintock-Fulkerson*
Comparative Literature 282. Structuralism, Poststructuralism and After. *Tompkins*
Comparative Literature 289. Topics in Feminist Theory. *Staff*
English 269. American Women Writers. *Pope or Tompkins*
English 287. Feminist Literary Theory. *Pope*
English 321. Gender and Power in Renaissance Texts. *DeNeef*
French 290S. Studies in a Contemporary Figure: Wittig. *Orr*
French 391. French Seminar: Autobiography. *Kaplan*

History 227-228. Recent United States History: Major Political and Social Movements. *Chafe*
 History 351.40. Colloquium in Women's History. *Scott*
 Literature 302. New Criticism in Literary Theory. *Staff*
 Political Science 200A. Contemporary American Feminism. *J. O'Barr*
 Public Policy Studies 264. Women and Justice. *Stack*
 Public Policy Studies 278. Human Service Bureaucracies. *Stack*
 Religion 234. Early Christian Asceticism. *Clark*

Zoology

Professor Gillham, *Chairman* (227 Biological Sciences); Associate Professor Rausher, *Director of Graduate Studies* (226 Biological Sciences); Professors Costlow, Fluke, Klopfer, Livingstone, McClay, Nicklas, H. Nijhout, Staddon, Tucker, Vogel, Wainwright, Ward, and H. Wilbur; Associate Professors Forward, Laurie, Lundberg, Ruderman, Sutherland, and Uyenoyama; Assistant Professor Roth; Lecturer M. Nijhout; Professors Emeriti Bailey, Bookhout, Gregg, Schmidt-Nielsen, and K. Wilbur; Adjunct Professor Schmidt-Koenig

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking the Ph.D. degree. The A.M. degree may be taken by students en route to the Ph.D., or by those who leave the doctoral program. Ordinarily, only students seeking the doctorate are admitted to the department.

In general, students entering the department will be equipped to pursue advanced degrees if they have completed an undergraduate major in biology along with some formal training in college level chemistry, mathematics, physics, and foreign languages. A reading knowledge of one foreign language is required of all doctoral students in zoology.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in both the *Bulletin of Duke University: Undergraduate Instruction* and the *Bulletin of Duke University: Graduate School* for information about the intellectual resources of the University. Special attention should be given to announcements of the Departments of Anatomy, Anthropology, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Pharmacology, Philosophy, Physiology, Psychology, Sociology, and Zoology; announcements of the Schools of Engineering and Forestry and Environmental Studies should also be consulted.

For Seniors and Graduates

The L suffix on a zoology course number indicates that the course includes a laboratory.

200. Advanced Neuroscience I. Prerequisite: Psychology 103. See C-L: Psychology 200. 3 units. *R. Erickson and McClay*

201L. Animal Behavior. Survey of past developments and current controversies in animal behavior. Extensive readings, followed by individual experimental or descriptive projects in the laboratory or field (or Primate Center). Recommended background: Zoology 74L, Zoology 151L, and Mathematics 117, or equivalents. 4 units. *Klopfer*

203L. Marine Ecology. Application of ecological theory to marine systems. Emphasis on hypothesis formulation, field experimentation, data analysis, scientific writing, and familiarity with current ecological literature. Prerequisite: course in introductory

ecology, invertebrate zoology, or marine botany (phycology); knowledge of statistics helpful. Offered at Beaufort. C-L: Marine Sciences. 6 units. *Hay (visiting summer faculty)*

204L. Community Ecology. Mechanisms that determine the distribution and abundance of plants and animals: geology, climate, physiography, soils, competition, predation, and history. Lectures focus on ecological principles. Seminars and weekend field trips. Prerequisites: an introductory ecology course and consent of instructor. C-L: Botany 267L. 3 units. *Christensen (botany) and Wilbur*

206S. Controversies in Biology. A contentious theme for reading, discussion, and an individual or joint paper. Illustrative past topics: the nature of the creative process, causality in biological thought, the lack of political impact of many scientific developments. Open to nonmajors. 3 units. *Klopper*

213L. Behavioral Ecology. How ecological factors shape foraging, mating, aggressive and social behavior. Laboratory experiments and field observations from the Outer Banks environment. Independent projects and seminars. Prerequisite: introductory biology. C-L: Marine Sciences 213L. 4 units. *Rubenstein*

216L. Limnology. Lakes, ponds, and streams: their origin, development, geochemistry, energy balance, productivity, and the dynamics of plant and animal communities. Laboratory includes field trips. Offered biennially. Prerequisites: introductory biology and Chemistry 12 and physics and Mathematics 32 or consent of instructor. 4 units. *Livingstone*

222L. Entomology. The biology of insects: diversity, development, physiology, and ecology. Field trips. Prerequisite: introductory biology. 4 units. *H. Nijhout*

226L. Ichthyology. Diversity, evolution, natural history, and ecology of fishes. Laboratory includes overnight field trips to marine and freshwater habitats. Prerequisites: introductory biology and Zoology 108L or equivalent. 3 units. *Lundberg*

234S. Problems in the Philosophy of Biology. Prerequisite: consent of instructor. See C-L: Philosophy 234S; also C-L: Botany 234S. 3 units. *Brandon (philosophy)*

237L. Systematic Biology. Theory and practice of identification, species discovery, phylogeny reconstruction, classification, and nomenclature. Prerequisites: introductory biology and one course in animal or plant diversity. C-L: Botany 237L. 3 units. *Lundberg and Mishler (botany)*

244. Principles of Immunology. Prerequisites: Zoology 160 and Chemistry 151 or consent of instructor. See C-L: Microbiology and Immunology 244. 3 units. *Amos, McClay, and staff*

245S. Radiation Biology. The biological effects of ionizing radiations: classical concepts in the context of recent research papers. Analytical uses of radiation. Prerequisites: introductory biology, Chemistry 11, 12, and Physics 51, 52. 3 units. *Fluke*

247S. Photobiology. Effects of visible light and of ultraviolet and near ultraviolet radiation in living systems: repair processes, quantum processes, physical optics. Prerequisites: college physics and introductory biology. 3 units. *Fluke*

249. Comparative Biomechanics. The structure and operation of organisms in relation to the mechanics of solids and fluids, including readings from the primary literature. Prerequisites: Physics 51 and Mathematics 31 or equivalents. Not open to students who have taken Zoology 149. 3 units. *Vogel and Wainwright*

250L. Physiology of Marine Animals. Environmental factors, biological rhythms, and behavioral adaptations in the comparative physiology of marine animals. Prerequisites: introductory biology and chemistry. C-L: Marine Sciences 250L. 4 units. *Forward*

259L. Laboratory in Biomechanics. Introduction to instruments used in investigations of solid and fluid biomechanics. Exercises and individual projects. Prerequisite: Zoology 249. 3 units. *Vogel and Wainwright*

269. Advanced Cell Biology. Structural and functional organization of cells and their components with emphasis on current research problems and prospects. Prerequisite: introductory cell biology or consent of instructor. C-L: Anatomy 269, Botany 269, Microbiology and Immunology 269, and The University Program in Cell and Molecular Biology. 3 units. *McClay and staff*

274L. Marine Invertebrate Zoology. Structures, functions, and habits of invertebrate animals under natural and experimental conditions. Field trips included. Not open to students who have taken Zoology 76L or 176L. Prerequisite: introductory biology. Offered at Beaufort. C-L: Marine Sciences 274L. 6 units. *Ruppert*

278L. Invertebrate Developmental Biology. Gametogenesis, fertilization, and development of invertebrates, with emphasis on experimental studies of prelarval stages. Prerequisite: consent of instructor. Offered at Beaufort. C-L: Marine Sciences 278L. 6 units. *McClay and visiting staff*

280. Principles of Genetics. Structure and properties of genes and chromosomes in individual organisms and in populations. Prerequisite: introductory biology. C-L: Botany 280, The University Program in Genetics, and Zoology 180. 3 units. *Antonovics (botany), Boynton (botany), and Gillham*

281S. DNA, Chromosomes, and Evolution. The relationship of chromosome and DNA-sequence organization with evolution; karyotype changes and speciation; repetitive DNA, split genes, transposable elements, and evolutionary mechanisms; phylogeny reconstruction; evolution of mitosis and the chromosome cycle. Prerequisite: Zoology 160, 180, or Botany 105. 3 units. *Laurie and Nicklas*

283. Extrachromosomal Inheritance. Genetics, biochemistry, and molecular biology of the organelles of eukaryotic cells, and cellular symbionts. Emphasis on recent literature. Prerequisite: introductory genetics. C-L: Botany 283 and The University Program in Genetics. 3 units. *Boynton (botany) and Gillham*

286. Evolutionary Mechanisms. Prerequisites: Botany 145L/245L or Zoology 74L, and a course in genetics. See C-L: Botany 286; also C-L: The University Program in Genetics. 3 units. *Antonovics (botany), Uyenoyma, and H. Wilbur*

287S. Macroevolution. Evolutionary patterns and processes at and above the species level; species concepts, speciation, diversification, extinction, ontogeny and phylogeny, rates of evolution, and alternative explanations for adaptation and evolutionary trends. Prerequisite: one course in plant or animal diversity. C-L: Botany 287S. 3 units. *Mishler (botany) and Roth*

288. Mathematical Population Genetics. Principles of formulation and analysis of dynamic mathematical models of genetic evolution. Rotating topics include: mating systems, sex ratio, stochastic processes. Prerequisite: calculus; statistics and linear algebra recommended. C-L: The University Program in Genetics. 3 units. *Uyenoyama*

293L. Population Biology. See C-L: Botany 293L. 3 units. *Antonovics (botany) and Wilbur*

295S, 296S. Seminar. Topics, instructors, and course credits announced each semester. 3 units. *Staff*

For Graduates

353, 354. Research. To be carried on under the direction of the appropriate staff members. Hours and credit to be arranged. C-L: Marine Sciences 353, 354. *Staff*

360, 361. Tutorials. An approved academic exercise, such as writing an essay or learning a research skill, carried out under the direction of the appropriate staff members. Hours and credit to be arranged. *Staff*

COURSES CURRENTLY UNSCHEDULED

233. Principles of Insect Behavior

355, 356. Seminar

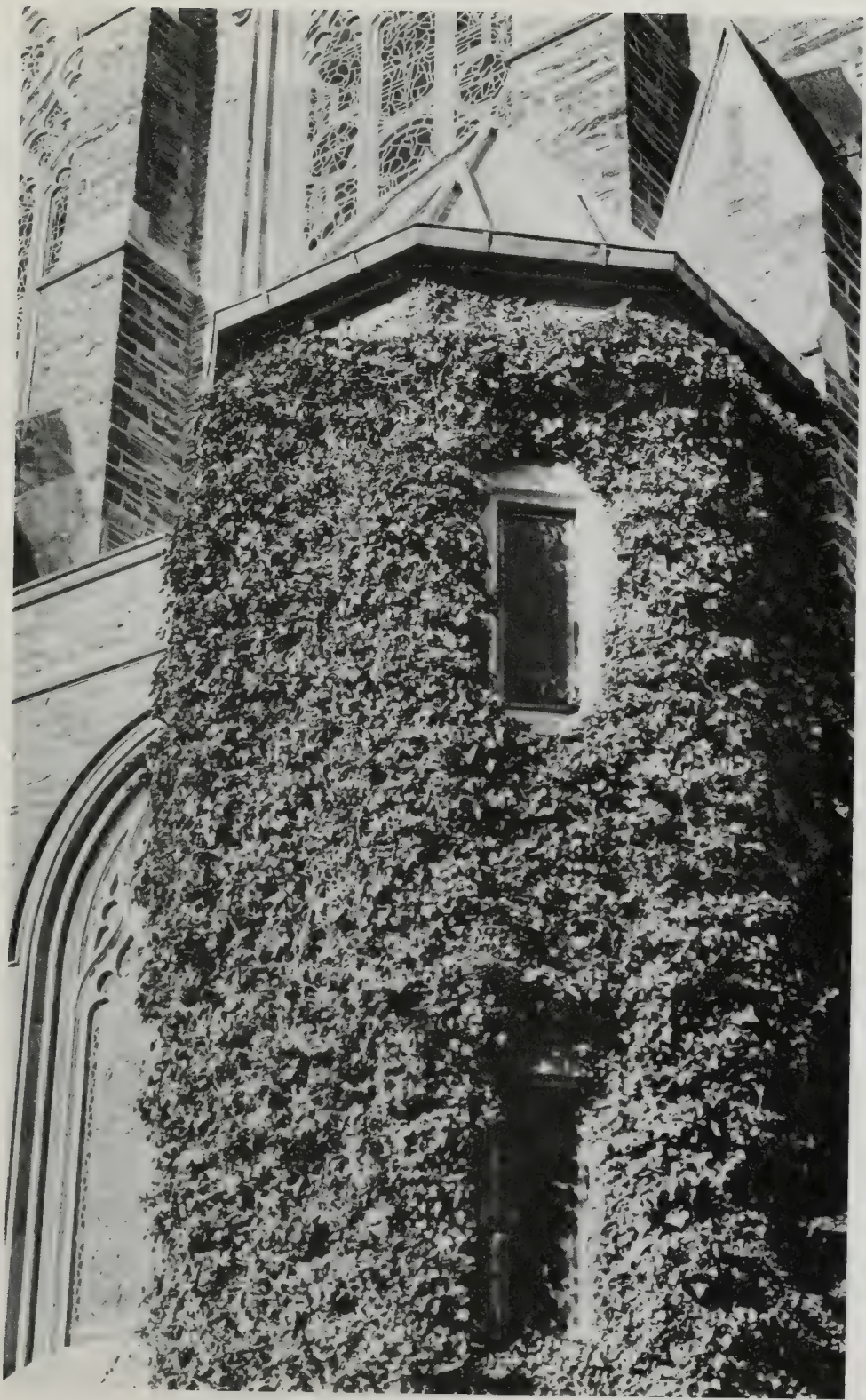
RELATED PROGRAMS

The University Program in Cell and Molecular Biology. See announcement in this bulletin.

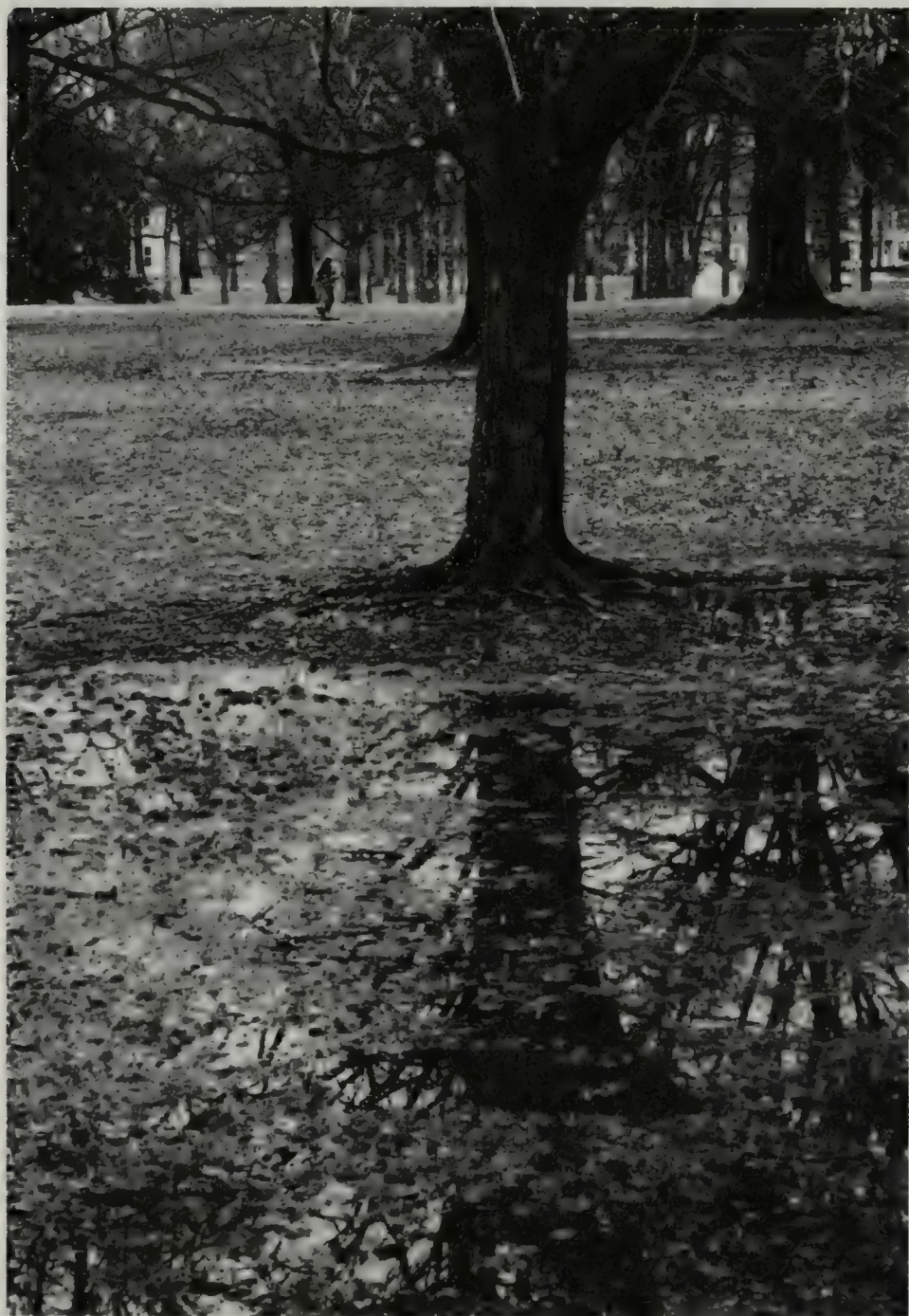
The University Program in Genetics. Genetics courses offered by the Department of Zoology are part of the University Program in Genetics; see announcement in this bulletin.

The University Program in Marine Sciences. Consult Marine Sciences in this bulletin for offerings at the Duke University Marine Laboratory.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Latin America. Refer to the section Organization for Tropical Studies in this bulletin in the chapter on "Special and Cooperative Programs."



Special and Cooperative Programs



Center for the Study of Aging and Human Development

The center is a multidisciplinary program devoted to research, training, and clinical activities in gerontology and geriatrics. Although the center does not offer degrees, the varied programs, research laboratories, and clinical settings provide a context and resource for undergraduate and graduate students and for health professionals with special interests in adult development and aging. The center conducts multidisciplinary, two-year programs for postdoctoral fellows interested in focused training for independent research on many varied aspects of aging and adult development. Resources of this all-University program include data from two longitudinal studies, a wide range of archival data of special interest to social scientists, an animal colony, and the center's basic and applied research laboratories. A division of geriatrics coordinates research, training, and services related to the care of older adults. Undergraduate and graduate students of the University are welcome to inquire about participation in all programs at the center. Inquiries should be addressed to Harvey Jay Cohen, M.D., Director, Duke University Center for the Study of Aging and Human Development, Box 3003, Duke University Medical Center, Durham, North Carolina 27710.

Asian-Pacific Studies Institute

The institute sponsors an agenda of visiting speakers and scholars and coordinates study abroad programs in China and Japan. A limited number of fellowships are granted which provide stipends for a two-year period. Fellows will be expected to reach the equivalent of third-year level of proficiency of language training during the term of their award. Incoming graduate students with the Ph.D. as their objective, students in good standing in the first year of study in Duke professional schools, and current Duke students enrolled in Ph.D. programs may be considered for these fellowships. Further information may be obtained from the Asian-Pacific Studies Institute, 2111 Campus Drive, Duke University, Durham, North Carolina 27706.

The Center for Biochemical Engineering

The Center for Biochemical Engineering offers versatile and broad education at the graduate level for students interested in developing and using engineering principles to understand and implement biological and biochemical processes. The programs of study in biochemical engineering are thus interdisciplinary. Students follow a program of course work to reinforce advanced principles of chemical process engineering, mathematics, and physics, as well as microbiology, biochemistry, immunology, and

genetics. Close relations are maintained with many departments and schools of the University, and research projects involving work in these other departments are encouraged. Major emphasis is placed on study leading to the Ph.D., the traditional degree of scholarship awarded for mastery of a significant field of knowledge. This mastery is demonstrated by a combination of course work in a major and minor field, completion of an original research project submitted as a dissertation, and a successful defense of the research. Programs leading to the Master of Science degree are also available. Students from non-engineering programs are encouraged to apply to either degree program. Further information may be obtained from the Director of Graduate Studies, The Center for Biochemical Engineering, Duke University, Durham, NC 27706.

Canadian Studies Program

The Canadian Studies Program is supported in part by grants from the U.S. Department of Education, the Ford Foundation, the Mellon Foundation, and departments of Canada's provincial and national governments. Its purpose is to formalize and expand the interest of graduate students in Canada, to introduce the study of Canadian life and culture at the undergraduate level, and to encourage such study in primary and secondary schools.

The program awards a limited number of graduate fellowships and teaching assistantships for the study of Canada to American residents. Fellows must work on a Canadian dissertation topic within their disciplines. Grants of travel aid for field research in Canada are also offered.

The program sponsors lectures by Canadian specialists and supports seminars devoted to Canada. Opportunities for study in Canada are offered to honors undergraduates in Canadian Studies, graduates, and faculty.

Inquiries should be addressed to the Director, Canadian Studies Center, 2016 Campus Drive, Duke University, Durham, North Carolina 27706.

Program in Russian and East European Studies

The graduate school of Duke University offers a program leading to the A.M. and Ph.D. degrees in several disciplines (economics, history, literature, linguistics, and political science), with a concentration in Russian and East European studies. Students are encouraged to utilize the libraries and facilities of both Duke and the University of North Carolina at Chapel Hill. The holdings of the two libraries in Russian and East European materials are substantial and complementary. Both libraries have a policy of purchasing all significant published works in Slavic history, economics, government, geography, literature, and linguistics. Other joint activities include periodic colloquia involving the personnel of the two institutions and distinguished visiting scholars.

For more information, contact Professor Martin A. Miller, Chair, Russian and East European Studies Committee, Center for International Studies, 2101 Campus Drive, Duke University, Durham, North Carolina 27706.

Center for Demographic Studies

The center promotes research and training in demographic and human ecology. Its facilities, located at 2117 Campus Drive, include a population library, the Joseph J. Spengler Collection of publications and research materials, and extensive data resources. The center does not offer degrees; it promotes the pursuit of advanced degrees, with a specialization in population studies, through either the Department of Sociology or the Department of Economics. The center's program provides opportunities for direct student participation in ongoing research projects. The program of extramural research stresses, but is not limited to, applied work in the demography of aging, health, mortality, fertility, and migration.

Inquiries for training opportunities may be directed to Dr. George C. Myers, Director, Center for Demographic Studies, Box 4732 Duke Station, Durham, North Carolina 27706.

The Program for the Study of Developed Shorelines

The Program for the Study of Developed Shorelines was established in recognition of a critical need for both academic programs and geological research on national coastal issues. The goal of the program is promotion of research, education, and publications concerned with oceanic shorelines already under development. A limited number of graduate research fellowships are available to both M.S. and Ph.D. candidates and post-doctoral support is available for individuals involved in appropriate research. The program is centered entirely within the Department of Geology and fellows supported by the program must satisfy all departmental requirements. For more information contact Professor Orrin Pilkey, Director, Program for the Study of Developed Shorelines, Department of Geology, Duke University, Durham, North Carolina 27709.

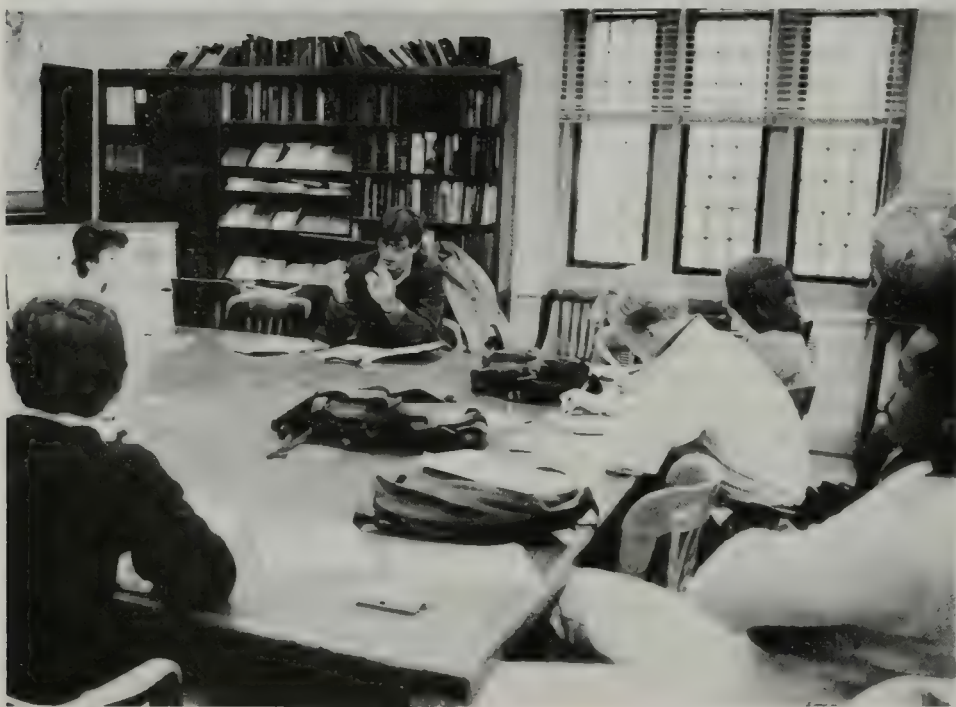
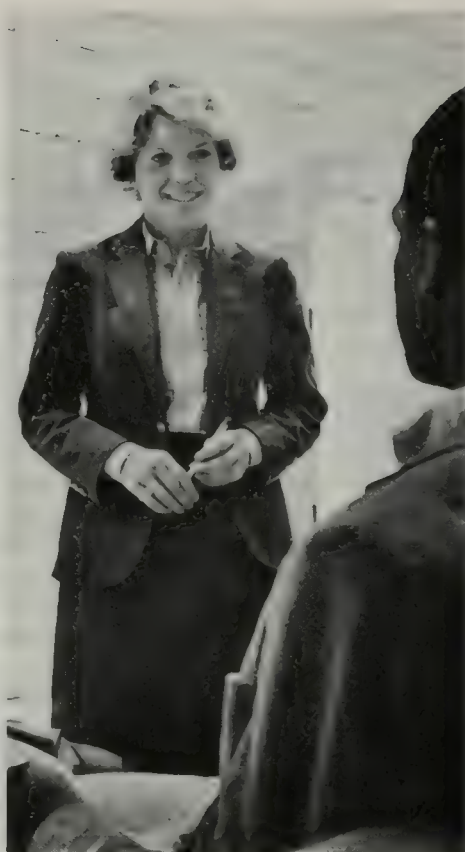
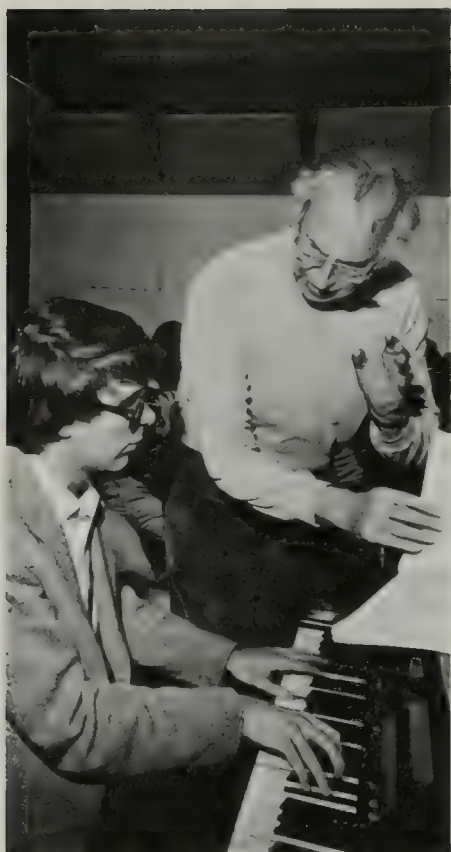
Islamic and Arabian Development Studies

The program in Islamic and Arabian Development Studies, established in 1977 with support from some twenty American and foreign corporations, sponsors teaching and research on Islamic themes with special reference to developmental problems of the Arabian peninsula. Emphasis is also placed on Afghanistan, Pakistan, and Muslim refugees. The program has sponsored three international conferences, has sent groups of faculty and students to Jordan and Saudi Arabia, and has sponsored a Duke student delegation to the Model Assembly of the League of Arab States. Its fourth international conference was held at the Rockefeller Conference Center, Bellagio, Italy, in October 1987 on the topic of Muslim refugees. The program arranged for the acquisition by the Perkins Library of the Malone Collection on Arabian Affairs and the Louis and Nancy Hatch Dupree Collection on Islamic Inner Asia. Its publication series released by Routledge and Kegan Paul of London includes volumes on Islam in the Philippines and the Genesis of American Orientalism as well as volumes on Pakistan and Saudi Arabia published elsewhere. It also sponsors an outreach program which includes Appalachian State University, Belmont Abbey College, the College of Charleston, Converse College, Davidson College, Johnson C. Smith University, Old Dominion University, and the University of the South. Inquiries should be addressed to Dr. Ralph Braibanti, Director, Islamic and Arabian Development Studies, 2114 Campus Drive, Duke University, Durham, North Carolina 27706.

Latin American Studies Program

The Graduate School offers an interdepartmental program in Latin American studies in conjunction with several departments: anthropology, history, economics, political science, sociology and Romance languages. In addition to fulfilling the requirements of their departments, students in the Latin American Studies Program undertake special courses of interdisciplinary study to broaden their knowledge of the Latin American field.

The holdings of Perkins Library for graduate work and research in Latin American history, inter-American relations, economic history, politics, art, and Spanish-American literature are constantly being enlarged. Program faculty are involved in different national research programs dealing with Latin American topics and offer advice on fellowship support for graduate research in Latin America and the Caribbean. Inquiries should be directed to the Council on Latin American Studies, Center for International Studies, 2122 Campus Drive, Duke University, Durham, North Carolina 27706.



Medical Historian Training Program

The Medical Historian Training Program is conducted under the auspices of the School of Medicine and the Graduate School. The M.D.-Ph.D. program requires a minimum of six years of graduate and medical study, and the M.D.-A.M. four or five years, depending on the use of summer terms. The M.D.-Ph.D. program is intended for those students who know that their major career effort will be in teaching and other scholarly activities in the history of medicine (not necessarily to the total exclusion of clinical medicine). The M.D.-A.M., on the other hand, is appropriate for those who are undecided, but who wish to acquire a firm foundation for future study. In both programs the first two years and the last year will be spent in the medical school. All requirements for the Ph.D. and the A.M. must be completed before the final year of the M.D. program.

Application and Admission Procedures. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History including the MCAT and GRE exams. Those candidates holding the M.D. degree will be considered for the Ph.D. and the A.M. degrees. Candidates who have completed two years of medical school will also be considered for either degree.

Applicants should complete and submit an application to the Graduate School for admission to the Department of History.

Additional information may be obtained by writing to Dr. Seymour Mauskopf, Director of Graduate Studies, Department of History, 233 Allen Building, Duke University Durham, North Carolina 27706.

Medical Scientist Training Program

The Medical Scientist Training Program, conducted under the auspices of the Graduate School and the School of Medicine, is designed for students with a strong background in science who are motivated toward a career in the medical sciences and academic medicine. It provides an opportunity to integrate graduate education in one of the sciences basic to medicine with the clinical curriculum of the School of Medicine. The program usually requires six to seven years of study and leads to both the M.D. and Ph.D. degrees. Although the special emphasis of this program is on basic medical science, the trainees, because of their education in clinical medicine, have a remarkable range of career opportunities open to them. Graduates of this program generally follow one of two broad paths. Some directly pursue careers in teaching and research in one of the basic medical sciences, while maintaining strong ties with clinical science as a result of their combined training; others enter residency programs before pursuing investigative and teaching careers in clinical medicine, carrying with them strong academic backgrounds in the basic sciences.

Eligibility. Applicants must meet the admission requirements of both the Graduate School as a candidate for the Ph.D. degree and the School of Medicine as a candidate for the M.D. degree. Most candidates apply for admission to the first year of the program, but applications are sometimes accepted from students who are enrolled in appropriate stages of their curriculum in the Graduate School or School of Medicine of Duke University. In addition to the minimum requirements for acceptance in the Graduate School and the School of Medicine, advanced course work in science and mathematics as well as prior research experience count heavily in the selection of candidates.

Financial Support. Students admitted to the first year of the program can receive a traineeship award, consisting of a stipend and full tuition allowance, provided by a grant from the National Institutes of Health. The present annual stipend is \$6,552. Current policy of the National Institutes of Health limits the duration of the traineeship to six years, but the years need not be consecutive; this permits curricula which take more than six years.

This traineeship, created by the National Research Service Award Act of 1974 (PL 93-348) provides (as do all research training awards under this act) for certain alternate service or payback requirements in the event that a research career is not pursued. Support by the NIH under the National Research Service Award Act requires the recipient to be a citizen or resident of the United States.

The Training Program. This program has been designed to offer trainees latitude in the selection of course material. Basic requirements are two academic years composed of the first basic science year and the second clinical science year of the curriculum for medical students at Duke University. Following completion of the second year, the trainee enters the graduate program to complete the requirements for the Ph.D. degree. A final academic year of elective clinical study is necessary to complete the requirements for the M.D. degree. Both degrees are awarded at the completion of this sequence.

Additional information may be obtained by writing Professor Salvatore V. Pizzo, Medical Scientist Training Program, Department of Biochemistry, Box 3711 Duke University Medical Center, Durham, North Carolina 27710.

Oak Ridge Associated Universities

Duke University is one of the sponsoring universities of the Oak Ridge Associated Universities located at Oak Ridge, Tennessee. The graduate research program at Duke has available to it all the facilities of the Oak Ridge National Laboratory and the cooperative supervision of student research by the staff at Oak Ridge. Fellowships in several fields of science are available to qualified applicants.

Graduate Fellowship Program. On application by a university, ORAU awards fellowships to candidates for the master's and doctor's degrees. The student uses the fellowship to conduct thesis research in certain federal laboratories.

The application deadlines depend upon the fellowship. Further information may be obtained from Judith Argon, Office of Research Support, 001E Allen Building.

Office of Research Support

The Office of Research Support, located in 001E Allen Building, provides assistance to faculty members (outside the Medical Center) who seek research funding and to graduate students who seek graduate fellowships. The office houses a library of reference materials dealing with external funding. The ORS Fellowship File contains fellowship information for faculty, postdoctoral fellows, and graduate students from a variety of sources. It is arranged primarily by discipline and also includes such categories as "study abroad" and "dissertation support." Graduate students may take advantage of the resources of the office by browsing through the information on their own or they may make an appointment to talk with the staff by calling 684-3030. The office also reviews all grant proposals submitted to external funding sources, negotiates with the agency, and processes the award. Office hours are from 8:30-5:00 daily; no appointment is necessary.

Center for Resource and Environmental Policy Research

The Center for Resource and Environmental Policy Research at Duke University is committed to the study of public policies on natural resources and the environment. Housed in the School of Forestry and Environmental Studies and initially supported by the Andrew W. Mellon Foundation, the center combines the efforts of a small permanent faculty with participation by business leaders, government officials, and the faculty and students of Duke University and other universities to provide a center of excellence for the analysis of contemporary resource and environmental policy issues. The center offers a forum for the examination of public and private responsibilities for natural

resources and the environment and provides a means to link the specialized knowledge of academia with the information needs of government and industry.

Graduate research assistantships are offered to qualified students researching resource and environmental policy problems. Support is available to students pursuing M.S., A.M., or Ph.D. degrees through the Graduate School at Duke University and in conjunction with the School of Forestry and Environmental Studies or other departments. Course work is offered in both intensive and semester-long formats.

For further information, write to the Center for Resource and Environmental Policy Research, 102 Biological Sciences Building, Duke University, Durham, North Carolina 27706.

Organization for Tropical Studies

Duke University is a member of an international consortium created to provide leadership in education, research, and the wise use of natural resources in the tropics. The basic OTS course, *Tropical Biology: An Ecological Approach*, extends for an eight-week period in January-March and in July-August. Advanced offerings are scheduled periodically in agroecology, anthropology, botany, earth sciences, forestry, geography, marine biology, meteorology, and zoology.

The application deadlines are March 1 and October 1. Fellowship applications for travel and subsistence in the field-oriented programs conducted in Costa Rica are available through the faculty representatives. Consult Dr. Donald Stone (botany), Dr. Richard White (botany), or Dr. John Lundberg (zoology) for information.

Center for Research on Women

The Duke-UNC Center for Research on Women was founded in 1982 as a collaborative endeavor between Duke University and the University of North Carolina at Chapel Hill to promote women's studies scholarship and research throughout the tri-state area of North Carolina, South Carolina, and Virginia; to support curriculum development in women's studies; and to disseminate women's studies research and information throughout the South. The center's principal focus is to explore the intersection of gender, race, and class, with a particular emphasis on the American South and Third World societies.

The center offers postdoctoral humanist-in-residence fellowships, funded by the Rockefeller Foundation, a limited number of unpaid visiting scholar affiliations, and opportunities for graduate student internships. Regular activities include an annual visiting lectureship series; a working paper series, *Southern Women: The Intersection of Race, Class and Gender*, published jointly with the research centers at Memphis State University and Spelman College; the publication of a biannual newsletter, *Branches*; and sponsorship of conferences, colloquia, and community events. The research center also houses *SIGNS: A Journal of Women in Culture and Society*.

The research center is located at 207 East Duke Building, (919) 684-6641, on the Duke campus, and at 03 Caldwell Hall 009A at UNC, (919) 966-5787. Dr. William H. Chafe is the Academic Director and Dr. Christina Greene is the Project Director.

Resources for Study



The Libraries

The libraries of the University consist of the William R. Perkins Library and its seven branches on campus (Biology-Forestry, Chemistry, Divinity, East Campus, Engineering, Music, and Mathematics-Physics); the Undergraduate Library; the Pearse Memorial Library at the Duke Marine Laboratory in Beaufort; the Fuqua School of Business Library; the School of Law Library; and the Medical Center Library. In June 1987, these libraries contained approximately 3,627,000 volumes. Approximately 10,000 periodicals, 14,000 serials, and 200 newspapers are received regularly. The collection includes about 7,500,000 manuscripts, 90,000 maps, 42,500 music scores, 575,000 microforms, and over 1,000,000 public documents.

In addition to noteworthy holdings in British history, English literature, American history and literature, Commonwealth studies, Latin American history, religion, and science, the libraries include several distinguished special collections of international reputation such as the George Washington Flowers Collection of Southern Americana, the Baker Collection of Wesleyana and British Methodistica, the Mazzoni Collection of Italian Literature, the Perez de Velasco Collection of Latin American History, the Jantz Collection of German Baroque Literature and German Americana, the Trent Collection of Walt Whitman, the Trent Collection in the History of Medicine, and the Strisower Collection of International Law.

THE WILLIAM R. PERKINS LIBRARY

Collections. The William R. Perkins Library, the main library of the University, houses most of the books and journals in the humanities and social sciences, large files of United States federal and state documents, public documents of many European and Latin American countries, publications of European academies and learned societies, and special collections from South Asian, Far Eastern, and Slavic countries. The newspaper collection, with nearly 530,000 microform pieces and several thousand bound volumes, has long eighteenth-century files; strong holdings of nineteenth-century New England papers; antebellum and Civil War papers of North Carolina, South Carolina, Virginia, and Georgia; and many European and Latin American papers. The manuscript collection of approximately 7,500,000 items is particularly strong in all phases of the history, politics, and social and economic life of the South Atlantic region and includes significant papers in English and American literature. The collection in the Rare Book Room contains scarce and valuable materials covering a broad range of fields. The Latin and Greek manuscript collection constitutes one of the outstanding groups of its kind in the United States. The collection of Confederate imprints is the largest in the country.

The branch libraries serve the academic disciplines bearing their names. The East Campus Library is primarily for undergraduate use; however, it also contains the principal collections for graduate and undergraduate study in art.

Materials on reference services, closed and open carrels, interlibrary loans, and microfilming/photocopying are available in the library.

THE MEDICAL CENTER LIBRARY

The Medical Center Library, located in the Seeley G. Mudd Communications Center and Library Building on the Medical Campus, provides services and informational resources necessary to further education, research, and clinical activities in the medical field. In addition to the faculties and students in the Schools of Medicine, Allied Health, and Medical Center graduate departments, the library serves the professional and technical staffs of Duke Hospital as well as other health professionals throughout North Carolina. Over 220,000 volumes are available; approximately 2,650 journal subscriptions are received currently. Professional reference librarians are available for assistance in the use of library resources, and arrangements may be made for individual or group tours, instruction, or specialized seminars.

The History of Medicine Collections, including the Josiah C. Trent Collection, consist of rare books and manuscripts and a supporting group of histories, biographies, bibliographies, pictures, and ephemeral materials. The rare books are available to all, but are restricted to library use. Most modern books may be borrowed. The History of Medicine Collections also include the Duke Authors Collection, which preserves an archival copy of each book published by a member of the Duke medical faculty.

The Frank Engel Memorial Collection consists of a small group of books for leisure reading in nonmedical subjects, supplemented by several newspapers and popular magazines.

A reserve collection of heavily used books and journals is maintained in the Medical Sciences Branch Library located in the Nanaline Duke Building and covers the fields of biochemistry, genetics, pharmacology, and physiology.

THE SCHOOL OF LAW LIBRARY

The School of Law Library, with over 370,000 volumes, serves both the University and the local legal community. It features comprehensive coverage of basic Anglo-American primary source materials, including nearly all reported decisions of federal and state courts, as well as current and retrospective collections of federal and state codes and session laws. Digests, legal encyclopedias, and other indexing devices provide access to the primary documents. A large section of the library collection is devoted to treatises on all phases of law and legal sciences, as well as history, economics, government, and other social and behavioral sciences relevant to legal research. The treatises are organized in the Library of Congress classification system and are accessible through a public catalog. Special treatise collections are maintained in several subject areas, including the George C. Christie collection in jurisprudence and the Floyd S. Riddick collection of autographed senatorial material. The library is a selective depository for United States government publications, with concentration on congressional and administrative law materials. The library receives the records and briefs from the United States Supreme Court, the Fourth Circuit Court of Appeals, and the North Carolina Supreme Court and Court of Appeals. In addition to its Anglo-American holdings, the library holds substantial research collections in foreign and international law. The foreign law collection is extensive in coverage, with concentrations in European law and business law materials. The international law collection is strong in primary source and treatise material on both private and public international law topics. Undergraduate and graduate students whose course of study requires access to legal literature may use the library. However, access to the library may be restricted during certain times because of accreditation standards.

RECORD LIBRARY

The Department of Music has a record library separate from the university libraries with facilities for listening to records and tapes. While all materials may be used in the listening room, recordings from the departmental collection may be borrowed only by faculty of the Department of Music. Any member of the community may borrow from the Arts Council Collection of more than 2,700 records for a nominal fee.

UNIVERSITY ARCHIVES

The Duke University Archives, the official archival agency of the University, collects, preserves, and administers the records of the University having continuing administrative or historical value. The institutional archives, which also include published material, photographs, papers of student groups and faculty, and selected memorabilia, are available for research under controlled conditions in 341 Perkins Library.

Science Laboratories

Computation Center. The Duke University Computation Center (DUCC) maintains an IBM 3083 System Complex with sixteen megabytes of memory, eight IBM 3380 disk drives, eight IBM 3350 disk drives, eight IBM 3330-11 disk drives, six IBM 3420 tape drives, one Xerox 8700 laser printer, three IBM high-speed printers, a CalComp digital plotter, and an IBM 2540 card reader/punch. The DUCC facility is connected by a high-speed microwave to the Triangle Universities Computation Center (TUCC) located in the Research Triangle Park.

TUCC is a regional computer network formed and operated jointly by Duke University, North Carolina State University at Raleigh, and the University of North Carolina at Chapel Hill. The computer equipment at TUCC consists of one IBM 3081 with thirty-two million bytes of memory, multiple 3330- and 3350-type disk drives, thirteen tape drives, card readers, and printers.

Duke's IBM 3083 is used mostly for administrative computing and as a high-speed link to TUCC. Also connected to TUCC are four medium-speed printers located in the Engineering Building, the Biological Sciences Building, the Sociology-Psychology Building, and West Duke Building on East Campus, as well as seven low-speed keyboard terminal clusters located at various points around the University. Seven clusters and two laboratories of IBM personal computers are also available. The laboratories are located in the Engineering Building and in North Building. Also available are several APPLE Macintosh microcomputer clusters.

All users of the Computation Center facilities are urged to obtain funds to pay for computer services. Users unable to obtain grant funding may ask for financial support from their departments when applying for services. More specific information regarding Duke computing facilities may be obtained from the Director of the Computation Center.

Botanical and Zoological Laboratories. Facilities for graduate study in the Departments of Botany and Zoology are located on the West Campus. The Biological Sciences Building contains well-equipped modern laboratories for teaching and research in the fields of botany, forestry, and zoology. Special facilities include animal rooms, greenhouses, darkrooms, refrigerated and controlled-environment laboratories, scanning and transmission electron microscopes, a Van de Graaf accelerator, X-ray machines, radiation and radioisotope equipment, and other modern research facilities. Extensive facilities for experimentation in environmental control of plant growth are available in the phytotron adjacent to the botany greenhouses.

The herbarium contains over 500,000 specimens and includes notable collections of mosses and lichens. Other assets for teaching and research are the Sarah P. Duke Gardens on the West Campus; the eleven-acre experimental plot and field laboratory developed

by the Department of Botany; the Duke Forest, comprising 8,300 acres of woodland adjacent to the West Campus; the field station for the study of animal behavior and ecology; and the Duke University Marine Laboratory, an interdepartmental facility located on a small island on the coast at Beaufort, North Carolina, where twenty-two buildings and a small flotilla of ships and boats provide teaching and research facilities for resident graduate students and faculty as well as visiting individuals or groups.

Duke University, through the botany and zoology departments, is a member institution of the Organization for Tropical Studies, Inc., a consortium of universities with field station facilities in Costa Rica that provide opportunities for course work and research in tropical science.

Highlands Biological Station. Duke University holds a contributing membership in the Highlands Biological Station at Highlands, North Carolina, on the southern edge of the Blue Ridge Mountains at an elevation of 4,118 feet. The station and the region offer an excellent opportunity for field studies and some laboratory work. A limited number of qualified students in botany and zoology may make arrangements to carry out research here. Scholarships for advanced study during the summer months are available through the station.

For further information contact Dr. M. D. Rausher, Department of Zoology, or Dr. N. L. Christensen, Department of Botany, Duke University, Durham, North Carolina 27706.

The Phytotron. The phytotron, a national environmental control facility operated for the National Science Foundation, is adjacent to the Biological Sciences Building and is administered by the botany department. The phytotron is an integrated series of plant-growth rooms, chambers, and greenhouses, with forty-six separately controlled environments providing more than 4,000 square feet of plant-growing space. The factors of the environment controlled in the units to study plant growth include light, temperature, nutrients, carbon dioxide concentration, and humidity. By using the conditions in various day and night combinations, an exceptionally large number of environments can be simulated for testing the growth responses of plants. The phytotron also includes research laboratories and facilities for studying and monitoring the physiological processes of plants.

Research space in the phytotron is available to graduate students and faculty at Duke and to members of other educational and research organizations. For information concerning the rental of research space, contact Dr. Boyd R. Strain, Director of the Phytotron, Department of Botany, Duke University, Durham, North Carolina 27706.

Duke Forest. The Duke Forest comprises approximately 8,300 acres of land in five major divisions and several smaller tracts. A ten-minute walk from campus will take one well into many parts of the Durham Division, and a network of roads and fire trails make almost all areas of the forest easily accessible.

The forest lies primarily in Durham and Orange counties, near the eastern edge of the piedmont plateau, and supports a cross-section of the woodlands found in the upper coastal plain and lower piedmont of the Southeast. A variety of timber types, plant species, soils, topography, and past land use conditions are represented. Elevations range from 260 to 760 feet. Soils of the region are derived from such diverse parent materials as metamorphic rock of the Carolina slate formation, granite, Triassic sedimentary rock, and basic intrusives.

The forest serves for research in such areas as forestry, zoology, botany, and ecology by faculty and students at Duke and neighboring universities. Background information useful to researchers covers such features as soils, topography, inventory, plantation and cultural records, as well as a bibliography of past and current studies. Current work on problems associated with developmental pressures at the urban-rural interface and integrated approaches to natural resource management have multiplied the value and ben-

efit of the forest. For information contact: Judson Edeburn, Duke Forest Resource Manager, Room 206-A Biological Sciences Building, Duke University, Durham, North Carolina 27706.

Forestry Sciences Laboratory. The Forestry Sciences Laboratory of the USDA Forest Service, Southeastern Forest Experiment Station is located in the Research Triangle Park near Durham. This research organization provides excellent opportunities to complement research conducted by students in the School of Forestry and Environmental Studies. Specialized research projects in timber investment opportunities, market efficiency, forest soils, insect toxicology, air pollution impacts, and the economics of forestry in developing countries are currently under way at the laboratory. The staff of the laboratory is available for consultation and participation in seminars. Arrangements may be made for students to conduct certain aspects of their research at the laboratory.

Marine Laboratory. The Duke University Marine Laboratory (DUML), an interdepartmental training and research facility of the University, is located on Pivers Island, adjacent to the historic seacoast town of Beaufort, North Carolina. Because of the richness and diversity of the area's flora and fauna (including direct access from the laboratory to the open ocean, Cape Lookout National Seashore Park and the Outer Banks, estuaries, sand beaches, wetlands, and coastal forests), the laboratory provides an excellent opportunity for marine biological study and research. The laboratory accommodates nearly 1,500 visitors per year, including fifteen to twenty resident graduate students who are involved in year-round activities. (For additional information concerning the graduate program, refer to the *Bulletin of Duke University: Marine Laboratory* or the section on marine sciences in the chapter "Courses of Instruction.") The physical plant consists of twenty-three buildings, including classroom laboratories, six research buildings, four dormitories, a maintenance complex, and a dining hall. The laboratory has skiffs, a 50-foot training vessel, the R/V *First Mate*, and a new 135-foot research and training vessel, the R/V *Cape Hatteras*, which is operated by the Duke/UNC Oceanographic Consortium.

For information concerning teaching and research space, write to the Personnel and Auxiliaries Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516.

Zoology Field Station. The Zoology Field Station, located less than one mile from campus, provides facilities for the study of penned, free-ranging, and caged animals in a protected wooded area of eighty acres. These facilities include soundproofed observation chambers, barns, aviaries, pens for large animals and birds, and two ponds. For information regarding research space, write to Dr. Mark D. Rausher, Department of Zoology, Duke University, Durham, North Carolina 27706.

Primate Center. The Duke University Primate Center is located in the Duke Forest about two miles from the main campus. The colony is composed of approximately 755 prosimian primates representing five families, eleven genera, nineteen species, and twenty-six varieties. This is both the largest and the most diversified colony of living lower primates in the world. The center also houses frozen, preserved, and fossil primate collections. These collections and animals are utilized by faculty members and both graduate and undergraduate students in the Departments of Anatomy, Anthropology, Forestry, Geology, Psychology, and Zoology for all qualified researchers in primate paleontology, prosimian aging, locomotion, cytogenetics, comparative anatomy, behavior, and physiology. Applications for graduate study in one of these areas should be directed to the Director of Graduate Studies of any of the six departments. For information pertaining to the use of the Primate Center, graduate studies, or availability of research space, write to Dr. Elwyn L. Simons, Director, Duke University Primate Center, 3705 Erwin Road, Durham, North Carolina 27705.

The Vivarium. The vivarium facilities are maintained solely to support research and teaching programs of Duke University. The central vivarium contains forty-four animal

housing rooms, four sterile operating rooms, two necropsy rooms, ten project rooms, and a diet kitchen. Presently, Duke medical students and physician's associate students attend classes in animal surgery at the vivarium. A farm facility also is available to accommodate dog kennels and large farm animals. The vivarium is staffed by veterinarians, technicians, and caretakers to assure humane care and treatment of animals. The vivarium is fully accredited by the American Association of Laboratory Animal Care which assures compliance with standards of NIH.

Psychology Laboratories. The facilities of the Department of Psychology include sound-attenuating and electrically shielded rooms, some for use with human subjects and others for use with animal subjects; rooms for computer-controlled experiments in human perception, memory, and language; electrophysiological recording rooms; and interconnected rooms to provide observation, communication, and videotaping capabilities for the study of social interactions and for the study of personality and clinical processes.

As well as such specially designed spaces, there is a variety of support facilities. To aid in the study of animal behavior and psychobiology, there are a breeding colony of ring doves and colonies of pigeons, rats, and mice. To aid in physiological research, there are surgeries, histology laboratories, and photographic darkrooms. To aid in data collection and analyses, for both human and animal experiments, there are facilities for microprocessor-controlled experiments and videotaping in a variety of situations, including special facilities for the study of operant conditioning, perception, and behavioral ecology.

Several laboratories have independent computers, some with graphics capabilities, and there are direct connections to the large-scale computers at the Triangle Universities Computation Center. There are also fully equipped machine, woodworking, and electronics shops staffed by full-time technicians. Additional facilities for research and teaching are available in the laboratories and clinics of the adjacent Duke Medical Center, in the Veterans Administration Medical Center nearby, and in the universities and research companies in the area.

A number of clinical installations for adults and children, specializing in clinical and guidance problems, cooperate with the department in providing facilities for research and training. Clinical research is often conducted at the Duke Psychology Clinic operated by the clinical psychology program. This facility offers a full range of clinical services to adults, children, and families.

Chemistry Laboratories. The Department of Chemistry is housed in the Paul M. Gross Chemical Laboratory. This well-equipped modern chemical laboratory provides conditions very conducive to research. In-house nuclear magnetic resonance facilities include Varian XL-300, IBM NR-80, JEOL 60 and 90 multinuclear FT-NMR spectrometers, and several routine proton instruments. The University NMR center, of which chemistry is a part, also includes GE GN-500 and GN-300 (wide bore) spectrometers. An ESR spectrometer, a Varian E-9, provides excellent facilities for research in electron spin resonance. Mass spectrometric service is provided by two Hewlett-Packard GC-MS systems, as well as access to other HR-MS instruments located in the Research Triangle area. X-ray diffraction cameras of all types are available, along with Enraf-Nonius automatic and Picker automatic full-circle diffractometers. Numerous instruments of varying sophistication for photoacoustic, fluorescence, infrared, U.V., and ORD-CD spectroscopy are available. Several preparative and analytical gas and liquid chromatographs are also located in the building. Computing facilities in the Department of Chemistry include a cluster of twelve IBM personal computers and a cluster of five remote job entry terminals which utilize an IBM Series 1, WIDJET system to access the dual IBM 370/165-Amdahl systems of the Triangle Universities Computation Center via a 19 Kb microwave link. The department also houses a DEC 11/42 system (1 Mbyte, 16 terminal) which operates in a multiuser FORTRAN environment emphasizing computer graph-



ics as a training tool. An AED 512 color graphics/imaging terminal is also available. Numerous other computers are associated with specific research groups. The department has a machine shop and an electronics shop. The facilities of the Duke University Marine Laboratory on the coast at Beaufort, North Carolina, are available for specimen and water collecting; joint research projects with members of the resident staff have been conducted in the areas of biological chemistry and chemical aspects of oceanography. The Department of Chemistry Library, with holdings of approximately 42,000 volumes, is also located in the Paul M. Gross Chemical Laboratory. The library receives 600 current scientific serial publications and has a terminal facility for complete information retrieval.

Physics Laboratories. The Physics Building is devoted to research and instruction in the Departments of Physics and Mathematics. Additional space is provided in the adjacent Nuclear Physics Building. Graduate students usually have office space in one of these two buildings.

Nearly half the Physics Building is devoted to special laboratories for research in molecular and atomic, nuclear, high-energy, low temperature, and solid-state physics, and in astrophysics and quantum electronics. Special equipment includes microwave facilities operating to beyond 1000 GHz; picosecond, dye, carbon dioxide, and far infrared lasers; one 4 MeV and one high-resolution 3 MeV Van de Graaf accelerator; a 30 MeV cyclotron/tandem Van de Graaf accelerator; a helium liquefier, cryostats, magnets, and associated equipment for research down to the millidegree Kelvin temperature range; a VAX 11/780 computer and several ancillary microcomputers for data processing in the high-energy physics laboratory; VAX 11/780 and VAX H/750 computers for collecting and processing data in the nuclear structure laboratory; and a Harris H-800 computer for general purpose use.

The Physics-Mathematics Library contains a large selection of books and periodicals. A spacious, well-equipped instrument shop, an electronics shop, and a glass shop located in the Physics Building are staffed by eight instrument makers, an electronics technician, and a glassblower.

Engineering Research Laboratories. The laboratories of the four departments of the School of Engineering contain extensive basic equipment that may be applied in several specialized fields. The facilities available for instruction and research are suggested by the following brief listing of equipment found in each department:

Biomedical Engineering. Ultrasound imaging and transducer laboratories; cellular electrophysiology and neurophysiology instrumentation; stereomicroscope, micromanipulators, stimulators, isolation units, and microelectrode puller; facilities for studying biomedical materials and surface interactions; polarizing microscope, internal reflectance infrared spectrophotometer, and dialyzers; soft tissue creep and relaxation test system; biocellular material testing equipment; quantitative videomicroscopy, laser fluorescence microscopy, and nanogram-level micromechanical testing equipment; microprocessor development systems; microprocessor data acquisition and control systems; cardiorespiratory measurements; respirator; and a VAX 11/780 and several PDP-11 and IBM digital computers.

Civil and Environmental Engineering. Well-equipped research laboratories are available for work in environmental engineering, soil mechanics and geotechnical engineering, solid mechanics and materials engineering, structural mechanics and structural engineering, fluid mechanics, water resources, and urban systems and transportation engineering. Available research facilities include three independent closed-loop electrohydraulic dynamic loading systems (MTS) capable of applying pulses of any shape and controlled in force or displacement modes, frequency range up to 100 cps., load capacity 6,000 and 50,000 lbs. (the 6,000 lbs. actuator can develop a constant crosshead speed up to 50,000 in./min.); equipment for fabricating specimens of and testing fiber-reinforced polymer composites; environmental chamber for testing in the temperature range of

-320° to 500°; ultra- high-pressure triaxial shear apparatus for confining pressures up to 100,000 psi; particle tracking X-ray equipment for soil deformation studies; rock- testing facilities; model-testing equipment for anchored walls, penetrometer studies, and deep pile foundations; a large-aperture research polariscope; a reflective photoelastic polariscope; sustained-loading facility for long duration in studies of prestressed concrete; wet and dry environmental laboratories equipped to analyze a range of physical, chemical, and biological processes; a fully integrated resource recovery pilot plant; calorimetry for the measurement of heating values of secondary fuels; air classifiers interfaced with computer readout; several microcomputers, including the CDC 110, Apple II, and IBM 5150 personal computers with graphics capability; and access to the extensive computer facilities of the Duke University Computation Center as well as the Triangle Universities Computation Center.

The research facilities in water resources are located both indoors and outdoors. Indoors, the laboratory houses flow-measurement devices (flumes, Venturi meters, manometers, etc.) and digital computation hardware. A dual capability teletype terminal is hard-wired to a Data General 32-bit MV/8000 computer supported by three-dimensional color graphic printers and, through an acoustic coupler, the same terminal can be switched to access an IBM 3081 computer at the Triangle Universities Computation Center, the WATSTORE data base system of the U.S. Geological Survey in Reston, Virginia, or any other computation system connected via telephone lines. Outdoors, the Sarah P. Duke Gardens watershed (about 100 acres on campus) has been instrumented with rain gauges, compound weirs, and liquid-level flow recorders enabling hydrologic simulation and calibration and verification with real data.

Electrical Engineering. Digital data processing laboratory equipped with the Data General 32-bit MV/20000 as a multi-user computer operating in a UNIX type environment for interactive design, graphics, computation, and computer-aided engineering; Digital Equipment Microvax work stations for VLSI design; Signal Processing Laboratory; microwave facilities for experimentation up to 35 GHz; robotics with a GE P-50 robot; solid-state laboratory with X-ray diffraction and EPR spectrometer; microprocessor laboratory; Digital Systems Laboratory; solid-state power conditioning laboratories with dedicated computers for controlling instruments, including digital processing oscilloscopes and network and impedance analyzers, and for computer-aided design; clean room and semiconductor nMOS fabrication laboratory for integrated circuits; access to the design, fabrication, and research facilities of the Microelectronics Center of North Carolina; and an ion implanter and MOCVD epitaxial growth system in a III-V compound semiconductor lab at the Research Triangle Institute.

Mechanical Engineering and Materials Science. Biotechnology Laboratory: The biotechnology laboratory investigates how temperature, chemicals, and light affect the rates and yields of plant and microbial processes. Research equipment includes Millipore filter-sterilization apparatus for media preparation, autoclaves, Wild M5A stereomicroscope, Olympus BHS compound microscope with fluorescence and photomicrography systems, photometer, irradiometer, UV-sterilization hood, digital pH/DO meter, colorimeter, shaker water bath, heating and cooling circulators, and crossed-gradient culture apparatus.

Biochemical Engineering Laboratory: The biochemical engineering laboratory has basic instrumentation including walk-in incubator and cold rooms; sterilization facility; analytical instrumentation laboratory with osmometer; chromatograph pH meter; stirred tank reactors; semi-continuous batch reactor; fluorescence and bright-field microscopes; micromanipulators and microrheometer.

Cellular Biomechanics Laboratory: A laboratory for characterizing and measuring the elastic and viscous properties of normal, human red cells, sickle cells and large, lipid vesicles. Also included are studies of the diffusion of fluorescent particles (protein, lipid, cholesterol) in real and artificial (lipid) membranes and studies of electrofusion and electroporation of red and artificial cells. This research employs bright-field and fluorescence microscopes, photon counter, microcomputers, AC and DC power supplies,

cassette recorders and monitors, precision micromanipulators and pressure transducers, and a home-built microrheometer.

Computer Laboratory: Capabilities include access to three AT&T 3B15 minicomputers via a local area network. Supercomputing capability is provided via a link to the Cornell Supercomputing Center and the Pittsburgh Supercomputing Center via an AT&T ISN wide area network. Access to the Triangle Universities Computation Center is via the ISN network. TUCC has several large IBM mainframe computers. The data acquisition lab is equipped with seven IBM PC-XT-based Keithley data acquisition systems. A Symbolics 3645 Lisp Machine and two Texas Instruments personal computers are used for research concerning applications of artificial intelligence to mechanical engineering problems. CADD capability is provided by Zenith PC-AT computers running CADKEY and an HP 9836 computer. Also available are a MicroVAX/Macintosh positron data acquisition system, a MicroVAX dedicated to heat transfer research and numerous IBM PCs and Apple Macintosh micros.

The Dynamic Systems and Control Laboratory: The dynamic systems and control laboratory has a variety of basic instruments for measurement and control, for example, storage and dual-beam cathode ray oscilloscopes; X-Y and strip chart recorders; acceleration, temperature, pressure, strain, and force transducers; electrodynamic shaker; and spectrum analyzer. A miniac analog computer available in the laboratory with built-in nonlinear function generator and digital logic capabilities can be used for linear and nonlinear system simulation and controller synthesis. Two robots and computer controls and simulations are available.

Fluid Mechanics Laboratory: The fluid mechanics laboratory offers a variety of instrumentation for experimental research in turbulence, including laser-Doppler and hot-wire anemometry. The laboratory includes a subsonic wind tunnel with six component balance.

Heat Transfer Laboratory: This laboratory provides equipment and instrumentation for temperature calibration and measurement, free and forced convection experiments, radiation pyrometry and spectral analysis, heat exchanger performance studies, and optical measurements of heat and mass transfer by a Mach-Zender interferometer. Research instrumentation and equipment include a 100-channel digital data acquisition system, temperature and pressure transducers, and various flow and energy measurement devices.

Materials Science Research Laboratory: Materials science research is supported by a full complement of facilities for modifying and testing the properties of materials and for examining the effects of changes in their internal structure. Heat-treatment and mechanical testing facilities include a variety of vacuum and controlled atmosphere furnaces for melting alloys, doping semiconductors, and growing crystals, metallurgical furnaces for heat-treating alloys, and a completely instrumented 10,000-pound capacity Instron mechanical testing machine. For materials analysis there is a large range of metallographic facilities, including hardness testers and optical, as well as scanning and transmission electron microscopes. The scanning electron microscope is equipped for energy dispersive chemical analysis and includes a dedicated data processing unit for both storage and analysis of energy-dispersive X-ray results. Other specialized equipment includes both Doppler-broadening and lifetime equipment for positron annihilation studies of defects in solids. Other specialized equipment includes access to X-ray diffraction units including a Berg-Barrett X-ray typograph camera, Debye-Scherrer camera with Gondolphi attachment, a back reflection Laue camera, and a liquid helium low temperature X-ray cryostat. Thin film deposition apparatus permits the preparation of a large variety of both metallic and semiconducting thin films by either normal vacuum deposition or by glow discharge decomposition methods. A variety of thin film test facilities, including high-sensitivity photoconductivity, thermoelastic testing, and other electrical and physical thin film testing apparatus is also available. A differential thermal anal-

ysis facility allows the determination of basic phase diagram information as well as quantitative calorimetric data for metallic, polymeric, and ceramic materials.

The shop facilities of the School of Engineering, as well as those located elsewhere on campus, are available to graduate students in all four departments.

The School of Engineering houses a Data 100 medium-speed card reader and printer which communicates directly with various computers located at the Triangle Universities Computation Center in the nearby Research Triangle Park.

F. G. Hall Laboratory for Environmental Research. The F. G. Hall Laboratory for Environmental Research contains eight hyperbaric and/or hypobaric pressure chambers used to simulate altitude or deep-sea diving conditions, for the purpose of both experimentation and medical treatments. The interconnected steel chambers can simulate depths of 3,600 feet, or altitude of 155,000 feet, a capability unmatched in the United States. In 1982 a research dive to 2,250 feet set a new world's record. Research of this type has led to the development of safer and faster decompression tables, better breathing mixtures, and improved types of diving equipment together with new treatments for diving accidents and diseases treated with high-pressure oxygen. The laboratory provides opportunities for basic and applied research and for training physicians, postdoctorates, and graduate students in pressure-related medicine and physiology. The program is multidisciplinary with major participation by the Departments of Anesthesiology, Physiology, Medicine, Surgery, and the School of Engineering. Administration is by the Vice President for Research, Dr. C. Putman.

The Medical Center. The Medical Center currently occupies approximately 140 acres. The southern portion is contiguous with the main quadrangle of the University and consists of the following: Davison Building, Duke Hospital South, Baker House, Barnes Woodhall Building, Diagnostic and Treatment Building, Ewald W. Busse Building, Eugene A. Stead Building, Clinical Research II, and the Edwin A. Morris Clinical Cancer Research Building.

The northern portion includes the Nanaline H. Duke Medical Sciences Building, Alex H. Sands Medical Sciences Building, Edwin L. Jones Basic Cancer Research Building, Clinical Laboratory and Medical Research Building, Bell Building, Seeley G. Mudd Communications Center and Library, Searle Center for Continuing Education, Eye Center, and Duke Hospital North.

In the western section of the campus are: Research Park Buildings I, II, III, and IV; the Vivarium; and the Animal Laboratory Isolation Facility. A new environmental safety building and a surgical oncology research building are under construction.

In the eastern section of the campus are Pickens Rehabilitation Center, Civitan Mental Retardation and Child Development Center, Child Guidance Center, and Trent Drive Hall.

Student Life



Living Accommodations

Duke University has several residential facilities in which single graduate and professional students live; however, married student housing is not available. Married students should refer to the section entitled Off-campus Housing.

Town House Apartments. Town House Apartments, located about three blocks from the main East-West Campus bus line, is a thirty-two-unit complex which houses single graduate and professional school students. These apartments are more spacious than most apartments found on campus or in Durham. Because of its location away from the academic facilities, students find that it offers a change from normal campus life and activities. They are available for continuous occupancy throughout the calendar year.

Each air-conditioned apartment includes a living room, a master bedroom, a smaller bedroom, a bath and a half, and an all-electric kitchen with a dining area. Spacious closets and storage spaces are provided within each apartment. A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months.

Occupants must make arrangements with the local utility companies to pay for electricity, gas, and telephone service. These companies usually require a deposit when initial applications for service are made. Utility companies should be contacted prior to arrival as it usually takes several days to obtain service.

Central Campus Apartments. During 1975, Duke University completed a 500-unit apartment complex. Apartments are available throughout the calendar year for continuous occupancy to single students attending graduate and professional schools.

All Central Campus Apartments are completely furnished by the University. An itemization of furnishings is included with the floor plans sent out in the application packet.

A swimming pool, located in the center of the complex, is open during the late spring and throughout the summer months. Additional facilities include a pub, convenience store, tennis courts, and basketball courts.

All utilities—water, heat, air-conditioning, and electricity—are provided. Telephones, which are provided in preinstalled locations in each apartment, are serviced through Duke University's Tel-Com telephone service. Central Campus Apartments residents are responsible for having their phones connected.

Efficiency, two-bedroom, and three-bedroom apartments are rented to single students. Efficiency units are very limited in number and are generally not available to new

students. Spaces in apartments for single students are provided on an individual basis with each student paying rent per academic term to the University. This method permits students to share apartments with others of their choice. When this is impractical, the Department of Housing Management strives to place persons with similar interests together.

Modular Homes. The University owns six prefabricated modular homes which are located one block from the main East-West Campus bus line. The houses, completely furnished, provide more privacy than most apartments and are available to single graduate and professional students for continuous occupancy throughout the calendar year.

In addition to having three bedrooms, each home contains a full bath, an all-electric kitchen, a dining area, and a living room. Sliding glass doors in the living room open onto a wooden deck. An outside storage area is provided in addition to spacious closets within the home. Except for the bathroom, kitchen, and dining area, the homes are completely carpeted and paneled.

Residents of the modular homes are responsible for making arrangements with local utility companies for electricity and telephone services.

Application Procedures. When students are informed of their acceptance to Graduate School they will also receive a postcard on which to indicate preference for University housing. This postcard should be returned to the Department of Housing Management. Detailed information on the types of accommodations and application forms will be forwarded to the accepted student. Assignment to all University housing is made on a first-apply, first-assigned basis, and it is not guaranteed.

Off-campus Housing. The Department of Housing Management maintains a listing of rental apartments, rooms, and houses provided by property owners or real estate agencies in Durham. These listings are available in the department only; during the summer an assistant is available to answer questions and aid students in their attempt to obtain housing off campus. Information on commercial complexes in the Durham area may be obtained by indicating a preference for off-campus housing on the postcard which you will receive with your acceptance notice. Except for assuring that owners sign a statement of nondiscrimination, off-campus property is in no way verified and neither the University nor its agents negotiate between owners and interested parties.

The search for accommodations should begin as soon as possible after acceptance to the Graduate School. A visit of two or three days will allow you the opportunity to make use of the off-campus service and to inspect personally the available facilities.

Duke University Marine Laboratory. The Duke University Marine Laboratory, located on Pivers Island, has cottage-type residence halls which are available. Further information may be obtained from the *Bulletin of Duke University: Marine Laboratory*.

Food Services

Graduate students who wish to eat on campus may participate in Duke University Food Services' innovative food program. The meal plan allows users to select the location, the time, and the type of food service they desire. At the desired operation, select from the offerings at that location and present your Duke card for payment.

East Court Cafeteria is located in the East Campus Union Building, and the *Blue & White Cafeteria* is located in the West Campus Union Building. These cafeterias afford customers the opportunity of paying a predetermined price and eating as much as they like. Each cafeteria offers a selection of six or seven entrees, a choice of vegetables, a salad bar, a pasta bar, yogurt bars, a dessert bar, and self-service ice cream.

Trent Cafeteria, in the mall on the lower level of Trent Drive Hall, offers a wide a la carte selection, plus a deli, ice cream fountain, and a large salad bar.

The *University Room*, located in the West Campus Union Building on the main level, is open Monday through Friday and serves breakfast, lunch, and a fine selection of steaks, chops, and seafood for dinner.

The *Rathskeller*, in the Bryan Center, offers gourmet burgers, pasta, broiled chicken, Mexican style foods, and salads.

The *Downunder*, located in the lower level of the Gilbert-Addoms Residence Hall, is open evenings and has a wide variety of fast foods.

The *East Campus Dope Shop* is a soda fountain, and the *Pub at Central* serves sandwiches and drinks.

The *Cambridge Inn* has big burgers, deli sandwiches, pizza by the slice, and several brands of draft beer. The *Boyd-Pishko Cafe* is fast food right in the middle of the Bryan Center. It offers breakfast biscuits, danish, donuts, and beverages. At lunch it offers burgers, hot dogs, chicken filet sandwiches, ice cream, salads, and beverages.

The *Sprout*, located at Trent Drive, and the *Leaf & Ladle*, in the West Campus Union Building, are salad bars with fresh vegetables, breads, fruits, and homemade soups.

The *Magnolia Room*, in the East Campus building, is open each evening, Tuesday through Friday. Seating is by reservation only. The *Oak Room*, on the second level of the West Campus Union Building, is a full-service restaurant with a wide variety of lunch-eon and dinner offerings.

Two other services are *Pizza Devil* for pizzas picked up or delivered, and *University Catering* for delivery of anything from coffee-break fare to a full meal. Catering arrangements can be made for groups or special occasions.

For more information on the meal plan and to open an account, visit the Auxiliaries Contract Card Office. It is located on the lower level of the West Campus Union Building, Room 024.

Services Available

Medical Care. The goals of the Duke Student Health Program are to provide comprehensive high quality medical care; to encourage students to make informed decisions leading to healthy lifestyles; and to act as a liaison when students need medical care not available at Student Health.

The components of the Student Health Program include:

1. The Student Health Clinic, located at the Pickens Health Center.
2. The University Infirmary, located on the fourth floor of Duke Hospital, South Division.
3. The Sports Injury Treatment and Prevention Clinic, located in the basement of Card Gym.
4. The Health Education Program, headquartered in the Pickens Health Center and operating campus-wide.

The Student Health Clinic at Pickens is open during both regular and summer sessions, and provides outpatient medical care for a broad range of primary care services, comparable to those available in a large family practice. The Infirmary is open twenty-four hours a day from the start of school in the fall until graduation day in the spring, and provides for recuperative care requiring bed rest. All currently enrolled full-time students are required to pay the Student Health fee which covers most services offered within the Pickens Health Center, at the Infirmary, at the Sports Injury Treatment and Prevention Clinic, and through Counseling and Psychological Services (CAPS). Information regarding this fee is available from the University Bursar. More information on covered services is available in the Student Health Program and CAPS brochures.

In addition to the Student Health Program, the resources of other services within the Duke University Medical Center are available to all Duke students and their spouses and children; however, charges for any and all services received from the Medical Center other than those covered by the Student Health fee are the responsibility of the stu-



dent, as are the charges for service received from physicians not associated with Duke University. The Student Health fee does not cover the cost of health care for spouses and dependent children of married students. Coverage of the married student's family is, however, provided in the University's Student Accident and Sickness Insurance Plan for an additional fee, and clinical services can be provided by the staff at the Pickens Health Center.

The University has made arrangements for a Student Accident and Sickness Insurance Plan to cover all full-time students for a twelve-month period. For additional fees a student may obtain coverage for a spouse and a child. Although participation in this program is voluntary, the University requires all graduate students to be financially responsible for medical expenses above those covered by the University Student Health Program through the University Accident and Sickness Policy, a private policy, or personal financial resources. Students who have equivalent medical insurance or wish to accept the financial responsibility for any medical expense may elect not to take the Duke plan by signing a statement to this effect. Each full-time student in residence during the fall and spring must purchase this student health insurance or indicate the alternative arrangement. The Student Accident and Sickness Insurance Policy provides protection twenty-four hours a day during the full twelve-month term of the policy for each student insured. Students are covered on and off campus, at home, while traveling between home and school, and during interim vacation periods. The term of the policy begins on the opening day of school in the fall. Coverage and services are subject to change each year as deemed necessary by the University.

All full-time students are enrolled in and charged for the Student Accident and Insurance Policy unless they submit properly completed and signed waivers by the published due date. All foreign students are required to enroll in the University insurance plan or complete the waiver listing the policy number and name of the insurance company providing their comparable coverage. Full payment for student insurance is due at the beginning of the term (insurance may not be paid via payroll deduction). More information on student insurance can be obtained through the office of the Dean of Student Life, or by contacting the Student Health Education Program at 684-6721.

Counseling and Psychological Services. Counseling and Psychological Services (CAPS) is a component of student services which provides a comprehensive range of counseling and developmental services to assist and promote the personal growth of Duke students.

The professional staff is composed of psychologists, clinical social workers, and psychiatrists experienced in working with young adults. They provide direct services to students including evaluation and brief counseling/psychotherapy regarding a wide range of concerns. These include issues of self-esteem and identity, family relationships, academic performance, dating, intimacy, and sexual concerns. Ordinarily students are seen for counseling by appointment. If your concern requires immediate attention, a CAPS staff member will assist you with the emergency at the earliest possible time.

Each year CAPS offers a series of self-development seminars focusing on skills development and special interests. These explore such interests as stress management, career planning, management of eating disorders, and issues pertaining to graduate and professional women. Interested students may contact CAPS for further information.

As Duke's center for administration of national testing programs, CAPS also offers a wide variety of graduate/professional school admissions tests and professional licensure and certification examinations.

Another function of CAPS is the availability of the staff to the entire University community for consultation and educational activities regarding student development and mental health issues affecting not only individual students but the campus community as a whole. The staff works with campus personnel including administrators, faculty, student health staff, religious life staff, and student groups in meeting needs identified

through such liaisons. Staff members are available to lead workshops and discussion groups on topics of interest to students.

CAPS maintains a policy of *strict confidentiality* concerning information about each student's contact with the CAPS staff. If students desire that such information be released to anyone, they must give written authorization for such release.

Initial evaluation and brief counseling/therapy, as well as career and skills development seminars, are covered by the student health fee. There are no additional costs for these services. If appropriate, referral may be made to other staff members or to a wide variety of local resources.

Appointments may be made by calling 684-5100 or coming by the office in 214 Old Chemistry Building, West Campus between 8:00 A.M. and 5:00 P.M. Monday through Friday. If a student's concern needs immediate attention, that should be made known to the secretary and every effort will be made to arrange for the student to talk with a staff member at the earliest possible time.

Office of Placement Services. Duke University maintains an Office of Placement Services which acts as a liaison between the University and potential employers in business and industry, education, and government. The office is located in 214 Flowers Building.

The staff is available to talk with graduate students about their future professional plans. Students who are eligible to register with the office are offered an opportunity to assemble a complete dossier of academic records and recommendations to support applications for permanent positions and to have a permanent file for future reference. Pertinent recommendations should be accumulated while the student is enrolled at Duke. Interviews with representatives visiting Duke are scheduled during the academic year for students registered with the Office of Placement Services.

All services are offered without charge to Duke students and alumni.

Student Affairs

Cocurricular Activities. Graduate students at Duke University are welcome to use such University recreational facilities as swimming pools, tennis courts, the golf course, and to affiliate with the choral, dance, drama, music, and religious groups. They may become junior members of the American Association of University Professors and may affiliate with Phi Beta Kappa and social fraternities.

A full program of cultural, recreational, and religious activities is presented by the Office of Cultural Affairs, the Duke University Campus Ministry, the Duke University Union, the Office of Student Activities, and recreational clubs. The Duke University Union sponsors a wide range of programs through its committees, which are open to all segments of the campus community. Included are touring Broadway shows; rock, jazz, and pop concerts; speakers; films; a film-making program; the largest fully student-run television station in the country; art exhibits in two galleries; and a broad program in crafts located in Southgate Dormitory and the Bryan University Center. The Aquatic Center and the Card Gymnasium pool are available to students, faculty, and staff families. The handball, racquetball, squash, and tennis facilities and the weight room in the basement of the Aquatic Center are also available. Interested students may participate in softball and other team sports.

The University Center complex includes the new Bryan University Center, which houses the Information Center, two drama theaters, a film theater, lounges, stores, meeting rooms, games room, the Terrace Cafe, art gallery, and other facilities; the West Union, which includes dining facilities; and Flowers Building, which includes student publications, Page Auditorium, and the University box office.

Inquiries should be directed to the Recreation Office, 105 Card Gymnasium; the Office of Cultural Affairs, 109 Page Building; Duke Chapel; the Duke University Union, Bryan University Center; or the Office of Student Activities, Bryan University Center.

Full information regarding the scheduling of major events and programs for the entire year will be found in the Duke University *Yearly Calendar*; detailed and updated information for the fall and spring semesters in the *Duke Dialogue*, available each Friday; updated information for the summer session in the *Summer Session Calendar*, published at the beginning of each summer term; and the *Duke Chronicle*, published each Monday through Friday during the fall and spring and each Thursday during the summer. Copies of the Duke University calendars may be obtained at the information desk, Bryan University Center, or the calendar office, Page Building. Also during the summer, the *Summer Session Calendar* is published weekly by the summer session office and is available at convenient locations.

Graduate and Professional Student Council. The Graduate and Professional Student Council is the representative body for the students of graduate departments and professional schools. The council provides a means of communication between schools and between graduate students and the administration. The council selects graduate students for membership on University committees. Representatives of each department and officers of the council are selected annually.

Religious Life. The Duke University Chapel, open from 8:00 A.M. until 10:00 P.M., provides a magnificent setting for daily prayer and meditation. In addition, a variety of worship experiences are provided throughout the week including the University service of worship at 11:00 A.M. each Sunday and noonday prayer each weekday during term. The 150-voice Chapel Choir is open by audition to all interested singers. The Graduate and Professional Student Fellowship, sponsored by Duke Chapel, provides ecumenical fellowship as well as service opportunities for interested students. Duke Campus Ministry also invites graduate students to participate in the various religious life groups. Contact the office of Minister or Associate Minister to the University, Duke Chapel, for further details.

Visiting Scholars

The libraries and other facilities of Duke University are made available, to the extent practicable, to faculty members of other colleges and universities who wish to pursue their scholarly interests on the Duke campus. Such visitors are not charged unless they wish to participate in activities for which a special fee is assessed. Inquiries pertaining to visiting scholars should be addressed to the department chairman concerned or the Dean of the Graduate School.

Postdoctoral Research

Scholars engaged in postdoctoral research often find it advantageous to use the resources of Duke University during the summer. The University welcomes these visitors and makes living accommodations available to them during the summer sessions from May 9 to August 8. Persons desiring research privileges (library and/or laboratory) should request approval through the department in which the research interests lie or through the Graduate School.

Index

- Academic Regulations, 47
- Academic and Cooperative Programs, 22
- Administration, 5
 - Executive Committee of the Graduate Faculty, 6
- Admission, 26
 - Application Fee, 27
 - Application Deadlines, 31
 - Continuing Education, 30
 - Examinations for, 29
 - Foreign Students, Procedures for, 29
 - Nondegree, 27
 - Notification of Status, 30
 - Prerequisites, General, 27
 - Procedures, 27
 - Summer Session, 29, 30, 31
- Aging and Human Development, Center for the Study of, 189
- Anatomy, 59
- Anthropology, 62
- Application Procedures, *see* Admission
- Archaeology, *see* Classical Studies
- Art and Art History, 64
- Asian Languages, 66
- Asian-Pacific Studies Institute, 189
- Assistantships: Graduate, Part-time Instruction, Research, 39
- Audit Fee, 35
- Biochemistry, 66
- Botany, 68
 - Laboratories, 199
 - Organization for Tropical Studies, 194
- Biochemical Engineering, 90
 - Center for, 189
- Biomedical Engineering, 91
- Business Administration, 72
- Calendar, 4, 31
- Canadian Studies Program, 189
- Cell and Molecular Biology, University Program in, 74
- Chemistry, 75
 - Laboratories, 202
- Civil and Environmental Engineering, 93
- Classical Studies, 77
- Cocurricular Activities, 214
- Commencement, 54
- Computation Center, 199
- Computer Science, 80
- Conduct, Standards of, 54
- Continuing Education, 27, 30
- Counseling and Psychological Services, 213
- Course Load, 43
 - See also* Residence Requirements, Courses of Instruction (departmental and subject listings)
- Credit, Graduate, 47
 - See also* Doctor of Philosophy and Master's Degrees (all), Time Limits
- Deadlines
 - Application, 31
 - Dissertation, 53, 54
 - Intention to Graduate, 51
 - Passing Preliminary Examination, 53
- Thesis, 50
- Degree Requirements, *see* Individual Degree listings
- Degrees Offered, 23
- Demographic Studies, Center for, 190
- Developed Shorelines, Program for the Study of, 190
- Dissertation, *see* Relevant Doctoral Degree
- Dissertation Expenses, 35
- Doctor of Philosophy Degree, 52
 - Committee, Supervisory, 52
 - Credit, 47
 - Deposit of Dissertation, 54
 - Dissertation, 53
 - Examinations, Final, 54; Preliminary, 53
 - Fees, Dissertation, 35
 - Foreign Language Requirement, 52
 - Major and Related Work, 52
 - Residence Requirements, 53
 - Time Limits, 53
 - Transfer of Credit, 47
- Duke Forest, 200
- Economics, 84
- Education, 89
- Electrical Engineering, 98
- Engineering, 90
 - Biochemical, 90
 - Biomedical, 91
 - Civil and Environmental, 93
 - Electrical, 98
 - Laboratories, 204
 - Mechanical and Materials Science, 102
- English, 106
 - as a second language, 49
- Entrance Tests
 - English Tests for Foreign Students, 29
 - Graduate Record Examination, 29
- Environmental Research Laboratory, F. G. Hall, 207
- Faculty, 6
- Fees
 - Athletic, 35
 - Audit, 35
 - Binding, 35, 54
 - Copyright, 35, 54
 - Health Fee, 36
 - Housing, 36
 - Late Registration, 33
 - Marine Lab, 35
 - Microfilming, 35, 54
 - Motor Vehicle Registration, 35
 - Thesis or Dissertation, 35
 - Transcript, 36
 - Undergraduate Courses, 35
- Fellowships and Scholarships
 - Application Procedures, 37
 - Departmental, 38
 - Endowed, 37
 - Federal, 38
 - Graduate Fellowships, 38
 - Graduate Scholarships, 39
 - James B. Duke, 37
 - Andrew W. Mellon, 37
 - Medieval and Renaissance Studies, 38

- Payment of Awards, 39
- Special Fellowships, 38
- See also* Financial Information, Special Fellowships, and Student Aid
- Financial Information, 32
- Food Services
 - Descriptions of Facilities, 210
 - Estimated Costs, 36
- Foreign Language Examination, 52
 - Waiver of, 50
- Foreign Students, 29
- Forestry and Environmental Studies, 109
- Forestry Sciences Laboratories, 201
- French, *see* Romance Languages
- Genetics, University Program in, 115
- Geology, 116
- Germanic Languages and Literature, 118
- Grades, 47, 48
- Graduate and Professional Student Council, 215
- Graduate Record Examination, 29
- Graduate School Foreign Language Test, 49
- Greek, *see* Classical Studies
- Health Administration, 120
- Health Program for Students, 211
- Highlands Biological Station, 200
- Hindi-Urdu, *see* Asian Languages
- History, 121
- Housing, 209
- Humanities, Master of Arts Program in, 125
- Identification Cards, 48
- Immunology, *see* Microbiology and Immunology
- Instructional Staff, 6
 - Emeriti Professors, 19
- See also* Courses of Instruction
- Insurance, 212
- Islamic and Arabian Development Studies, 191
- Italian, *see* Romance Languages
- Judicial Code, 55
- Laboratories, 199
- Language Requirements, 49, 50
- Latin, *see* Classical Studies
- Latin American Studies Program, 191
- Leave of Absence, 49
- Liberal Studies, Master of Arts Program, 23, 29, 125
- Libraries, 197
- Literature, Ph.D. Program in, 23, 126
- Living Accommodations
 - Application Procedure, 210
 - Cost of, 36
 - Description of, 209
- Loans, 39; *see also* Financial Information
- Marine Laboratory, 201; *see also* Botany, Chemistry, Zoology, and Marine Sciences, the University Program
- Marine Sciences, University Program in, 127
- Master of Arts Degree, 49
 - Examining Committee and Examination, 50
 - Filing Intention to Graduate, 51
 - Language Requirements, 50
 - Major and Related Subject Requirements, 50
 - Nonthesis Option for Completion of Program, 51
 - Prerequisites, 49
 - Time Limits, 52
 - Thesis, 50
 - Transfer of Credits, 51
- Master of Health Administration Degree, 23, 51
 - Prerequisites, 51
 - Major Subjects, 51
- Master of Science Degree, 50
 - Language Requirement, 51
 - Major and Related Subjects, 51
 - Prerequisites, 50
 - Thesis and Examination, 51
- Mathematics, 130
- Mechanical Engineering and Materials Science, 102
- Medical Care, 211
- Medical Center, 207
- Medical Historian Training Program, 191
- Medical Scientist Training Program, 193
- Medieval and Renaissance Studies, Program in, 133
- Microbiology and Immunology, 135
- Motor Vehicle Registration, 35
- Music, 137
- Neurobiology, University Program in, 139
- Nondegree Admission, 27, 29
- Oak Ridge Associated Universities, 194
- Part-Time Graduate Study, 29
- Pathology, 140
- Pharmacology, 142
- Philosophy, 144
- Physical Therapy, 146
- Physics, 148
 - Laboratories, 204
- Physiology, 151
- Phytotron, 200
- Placement Services, 214
- Polish, *see* Slavic Languages and Literatures
- Political Science, 153
- Postdoctoral Research, 215
- Primate Center, 201
- Program Information, 22
- Psychology, 159
 - Laboratories, 202
- Public Policy Studies, 162
- Reciprocal Agreements with Neighboring Universities, 48
- Refunds
 - Summer Session, 34
 - Tuition, 34
- Registration, 42
 - Change of, 43
 - Fall, 43
 - Late, 43
 - Periods, 43
 - Summer Session, 44
- Related Subjects, *see* Relevant Degree Program
- Religion, 167
- Religious Life, 215
- Research Support, Office of, 194
- Residence Requirements
 - Academic Regulations, 53
- See also* Course Load
- Resource and Environmental Policy Research, Center for, 194
- Romance Languages, 174
- Russian, *see* Slavic Languages and Literatures
- Russian and East European Studies, Cooperative Program in, 190
- Scholarships, *see* Fellowships and Scholarships, and Student Aid
- Slavic Languages and Literatures, 177

- Sociology, 178
- Spanish, *see* Romance Languages
- Special Fellowships, 38
 - See also* Fellowships and Scholarships
- Standards of Conduct, 54
- Student Affairs, 214
- Student Aid
 - Assistantships, 39
 - Fellowships and Scholarships, 37
 - Loans, 39
 - Payment of Awards, 39
 - Summer Session, 40
 - Work-Study Program Employment, 40
- Summer Session
 - Admission, 29, 31
 - Credit, 47
 - Financial Aid, 40
 - Refunds, 34
 - Registration, 44
 - Tuition and Fees, 33
- Thesis
 - Expenses, 35
 - See also* Relevant Master's Degree
- Toxicology, University Program in, 181
- Transfer of Graduate Credit, 47, 51
- Tropical Studies, Organization for, 194
- Tuition, 33
 - Benefits for Employees, 34
- Transcript Fee, 35
- Undergraduates
 - Courses Primarily for, 48
 - Duke Students, Graduate Credit for, 47
- Visiting Scholars, 215
- Vivarium, 201
- Withdrawal or Interruption of Program, 48
- Women's Studies, 182
- Women's Studies Research Center, 195
- Work-Study Program, 40
- Zoology, 183
 - Laboratories, 199
 - Organization for Tropical Studies, 194
- Zoology Field Station, 201

Bulletin of Duke University
(USPS 073-680)
Durham, NC 27706

POSTMASTER send change of address
to: Office of Admissions
Graduate School
Duke University
Durham, NC 27706

2nd Class
Postage
PAID
at Durham, NC

bulletin of
Duke University
1988-89

Graduate School



bulletin of
Duke University
1988-89

Graduate School

EDITOR
Judy Smith
SENIOR EDITORIAL ASSISTANTS
Jean Carlton
Elizabeth Matheson

PHOTOGRAPHS
Jimmy Wallace

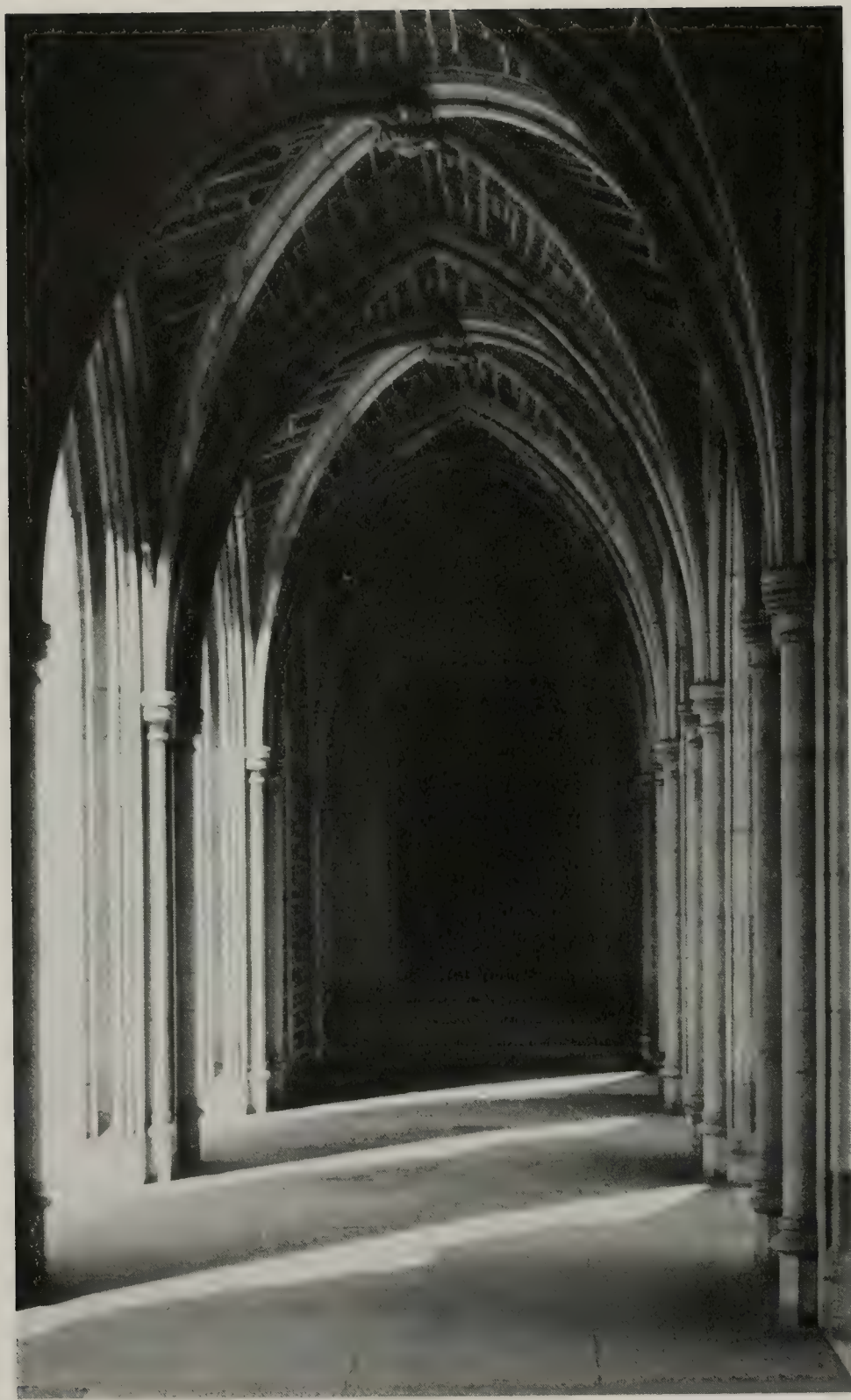
Typesetting by Paste-Ups, Ltd., Research Triangle Park, North Carolina
Printed by William Byrd Press, Richmond, Virginia

Duke University does not discriminate on the basis of race, color, national and ethnic origin, sex, handicap, or age in the administration of educational policies, admission policies, financial aid, employment, or any other University program or activity. It admits qualified students to all the rights, privileges, programs, and activities generally accorded or made available to students. For further information, contact Dolores L. Burke, Equal Opportunity Officer, (919) 684-8111.

The information in the bulletin applies to the academic year 1988-89 and is accurate and current, to the best of our knowledge, as of April, 1988. The University reserves the right to change programs of study, academic requirements, lecturers, teaching staffs, the announced University calendar, and other matters described in the bulletin without prior notice, in accordance with established procedures.

The Bulletin of Duke University, Volume 60, includes the following titles: *The Fuqua School of Business*; *The School of Forestry and Environmental Studies*; *Marine Laboratory*; *Undergraduate Instruction*; *The Graduate School*; *The Medical Center*; *The Divinity School*; *Information for Prospective Students*; *The Graduate School (short form)*; *Allied Health Programs*; *The School of Law*; and *Information and Regulations*.

Introduction	9
A Community of Scholars	9
The Decision to Go to Graduate School	9
Choosing a Graduate School	11
Duration of Program	13
 Duke University Graduate School	 15
Teaching and Research	15
Special Programs	16
General Regulations Governing Graduate Studies	22
Admission	22
Earning the Degrees	26
The Language Requirement	26
Other Requirements	26
Financial Information	27
Calendar of the Graduate School	31
 Advanced Degree Programs	 33
An abbreviated list of course offerings and program descriptions, 1988-89	

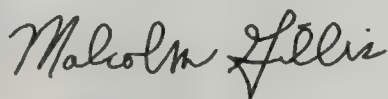


To the Prospective Graduate Student

A graduate school is where excellence is established in a university. At Duke, the Graduate School is where the two essential functions of a university, teaching and research, truly come together. Over the years Duke's strength at the graduate level has grown in all the main fields of knowledge. The nineteen-eighties have been particularly fruitful years for recruitment of faculty, establishment of new programs, and attraction of outstanding students. The faculty enjoys international distinction. The laboratories, libraries, and computer facilities are among the very best. Yet the Graduate School remains small enough so that personal contact is a central feature of our programs, and fruitful interaction across disciplines is a common experience, both for faculty and students.

For the student in search of a strong graduate education, Duke University has much to offer. This is a community in which minds and ideas grow. We provide training for many careers, but we also seek to foster personal creativity and to provide stimulating yet congenial surroundings for productive education and research.

The following pages provide the information you require in making the important choice of the course of your graduate education. We look forward to welcoming you to the Duke community of scholars.

A handwritten signature in cursive script, reading "Malcolm Gillis". The signature is written in dark ink and is positioned above the printed name and title.

Malcolm Gillis
Dean of the Graduate School

University Administration

General Administration

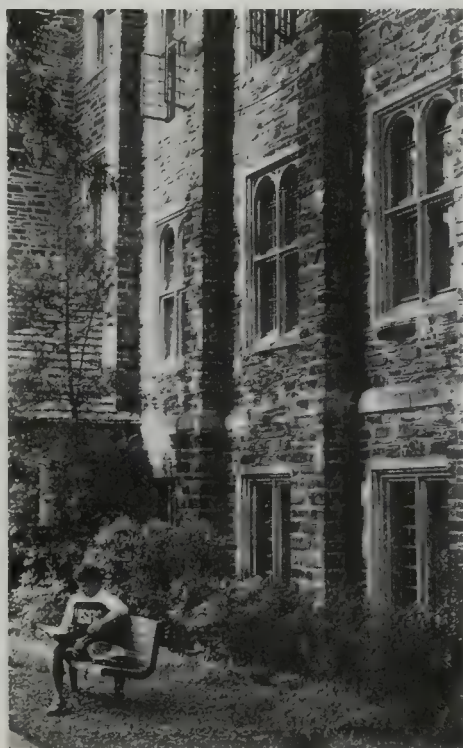
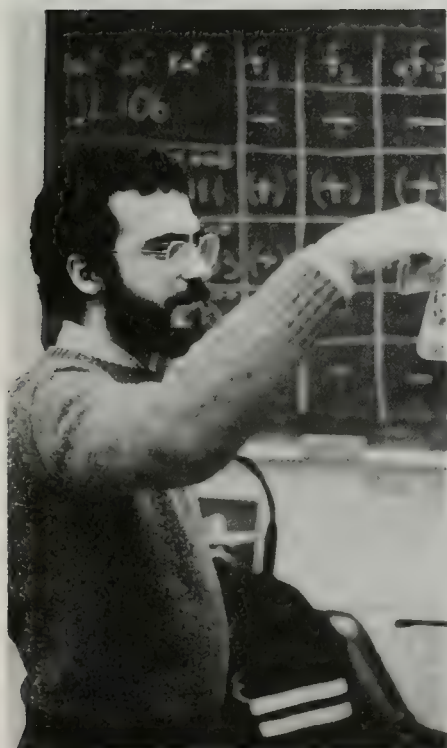
H. Keith H. Brodie, M.D., LL.D., *President*
Phillip A. Griffiths, Ph.D., *Provost*
Eugene J. McDonald, LL.D., *Executive Vice-President*
William G. Anlyan, M.D., D.Sc., *Chancellor*
Joel L. Fleishman, LL.M., *Vice-President*
J. Peyton Fuller, A.B., *Vice-President, Planning and Treasurer*
William J. Griffith, A.B., *Vice-President for Student Affairs*
John J. Piva, Jr., B.A., *Vice-President for Alumni Affairs and Development*
Patricia C. Skarulis, M.A., *Vice-President for Information Systems*
Andrew G. Wallace, M.D., *Vice-President for Health Affairs*
John F. Adcock, M.B.A., *Corporate Controller*
N. Allison Haltom, A.B., *Secretary of the University*

Graduate School Administration

Malcolm Gillis, Ph.D., *Dean of the Graduate School*
A. Leigh DeNeef, Ph.D., *Associate Dean*
Donna Lee Giles, A.B., *Assistant Dean*
Katharine Pfeiffer, M.A., *Assistant Dean*
Aleane G. Webb, *Assistant Dean*

Executive Committee of the Graduate Faculty

Dean Malcolm Gillis
William Ascher
Robert Bates
Jeffrey R. Dawson
Alfred Goshaw
Herbert Hacker
Stanley Hauerwas
Robert Hochmuth
Peter Lange
Annabel Patterson
George Pearsall
Salvatore Pizzo
Lewis Siegel
Kathleen Smith
Larry Todd
Bruce Wardropper
Charles Young





Introduction

A Community of Scholars

Writing in the 1920s the philosopher and man of science, Alfred North Whitehead, defined the purpose of a university in these terms: "The justification of a university is that it preserves the connection between knowledge and the zest for life by uniting the young and the old in the imaginative consideration of learning." If this is true of a university generally, it is true of a graduate school especially. Faculty members and graduate students work together in the imaginative recasting of ideas necessary for successful research and the development of human knowledge.

Ideally, a graduate school is a community of scholars engaged in imparting and extending the realm of human knowledge in the arts and sciences. A select group of students is admitted each year to undergo the rigorous discipline of an advanced degree program, the successful among them to emerge as scholars of promise. To enter into graduate education today is to accept a real challenge, and this decision should not be made casually. The work toward a doctorate requires several years of tireless effort and possibly sacrifice, and the material rewards may be less certain than in some alternative endeavor. However, pursued with determination, graduate education can be the doorway to a stimulating, creative, and meaningful life. The student who is contemplating this challenge may have many questions in mind; the material that follows is an attempt to answer some of them.

The Decision to Go to Graduate School

The decision to work toward an advanced degree must be a personal commitment born of a willingness to devote oneself to many months or possibly years of academic discipline just at an age when one may be impatient for financial independence and freedom from academic discipline. Graduate study requires all of one's energy and enthusiasm; to enter into it half-heartedly is to invite discouragement or failure.

Qualities instrumental for success in graduate study are a natural curiosity and the capacity for self-discipline. A good undergraduate record may or may not be adequate evidence of these characteristics. Many students with excellent undergraduate records have been unsuccessful in graduate study because their undergraduate training stressed the marshalling and articulation of facts rather than real understanding and analysis of material. On the other hand, many distinguished scholars had undistinguished undergraduate records. In gaining admission to a graduate school, the undergraduate record



is, of course, an important element, but usually some margin is left to allow for students who develop serious academic interests late in their undergraduate careers. Students are often best able to judge for themselves whether their grades truly gauge their abilities.

There is no unerring way of knowing in advance whether one will be successful or happy in graduate school. It is quite likely, however, that if one has both motivation and ability and does not try it, there will be regrets in later years. Although the decision must be an individual choice, superior intellectual ability is a scarce human resource, and the encouragement and utilization of it is a matter of community as well as personal concern.

Choosing a Graduate School

Over 250 universities today offer work leading to the Ph.D. degree. Among these are about 60 institutions which grant only two or three such degrees a year in all fields combined. At the other end of the scale are about 50 universities which account for nearly 70 percent of all doctorates granted in this country. Duke University is among the latter, as are most of the major institutions which offer programs in a wide range of academic disciplines. But even if one can narrow the field to about 50 major institutions, how does one select among these, and what factors should affect one's final choice? A few key factors are discussed briefly below.

Size. Size is not an infallible guide to the quality of a graduate school. There are a number of poor graduate schools of exceedingly large size and a number of extremely good small ones. However, the ideal is a small number of superior students working closely in intellectual pursuits with a few esteemed scholars. It might be helpful simply to mention a few of the disadvantages of too many or too few students.

In an extremely large graduate school—there are some that have between 6,000 and 12,000 enrolled—classes of 50 to 100 students, inaccessibility of senior faculty, shortage of library materials and facilities, and only a nodding acquaintance with fellow students are a few of the possible drawbacks. An able student may develop well even in this atmosphere of mass production, but it is hardly the ideal.

An extremely small graduate school also has its disadvantages. Facilities are often limited, and the faculty is likely to be composed primarily of undergraduate instructors. A university must be willing to commit a significant portion of its resources to develop a graduate program of high quality, and this is often not the case in an extremely small graduate school.

More important than the size of the entire graduate school is the size of the particular departmental program in which a student is interested. An optimum doctoral program will have an enrollment of perhaps 30 to 100 students, admitting 15 to 40 new students each year and awarding perhaps three to ten Ph.D. degrees a year. This information is usually available in university catalogs or government publications on higher education.

Duke University is committed to programs of moderate size in which the interests of the student are important. Total enrollment in the Graduate School is 1,624 students. Between 500 and 550 new students are admitted each year from approximately 3,100 applications. Only six departments have more than 80 students; twenty-four departments have enrollments that fall within the optimum range suggested in the preceding paragraph.

Quality. Not only do universities differ considerably in their reputation for quality, but there are marked differences among departments within any university. Many excellent universities have a few weak departments in which a student would fare less well than in an excellent department in a less esteemed institution. Therefore, the student should not be guided solely by the reputation of a university as a whole, but should inquire more specifically about the area of specialization.

Since judging the quality of a graduate program is necessarily subjective, no two people are likely to be in complete agreement. Prospective students would do well to talk

with their undergraduate professors, particularly those who have themselves achieved some reputation in the world of scholarship. As witnessed by their own continuing writing and research, they are more likely to have reliable information on the merits of various graduate programs. Similarly, younger faculty members who are only four or five years out of graduate school may have more recent acquaintance with their own and other schools.

Another guide may be occasional questionnaires asking educators to rank various graduate departments.

Alone, none of these guides is adequate; however, in conjunction with individual advice and recommendations, they can serve as useful indicators. In summary, the best procedure is to take as many factors as possible into account, and then to apply to three or four of the schools high in consideration. (Applying to fifteen universities is a waste of the applicant's and the universities' time.) Write to the graduate school or to the departmental Director of Graduate Studies if further information is desired; visit the university in person, if possible; and carefully weigh the advice of distinguished faculty members of one's undergraduate college.

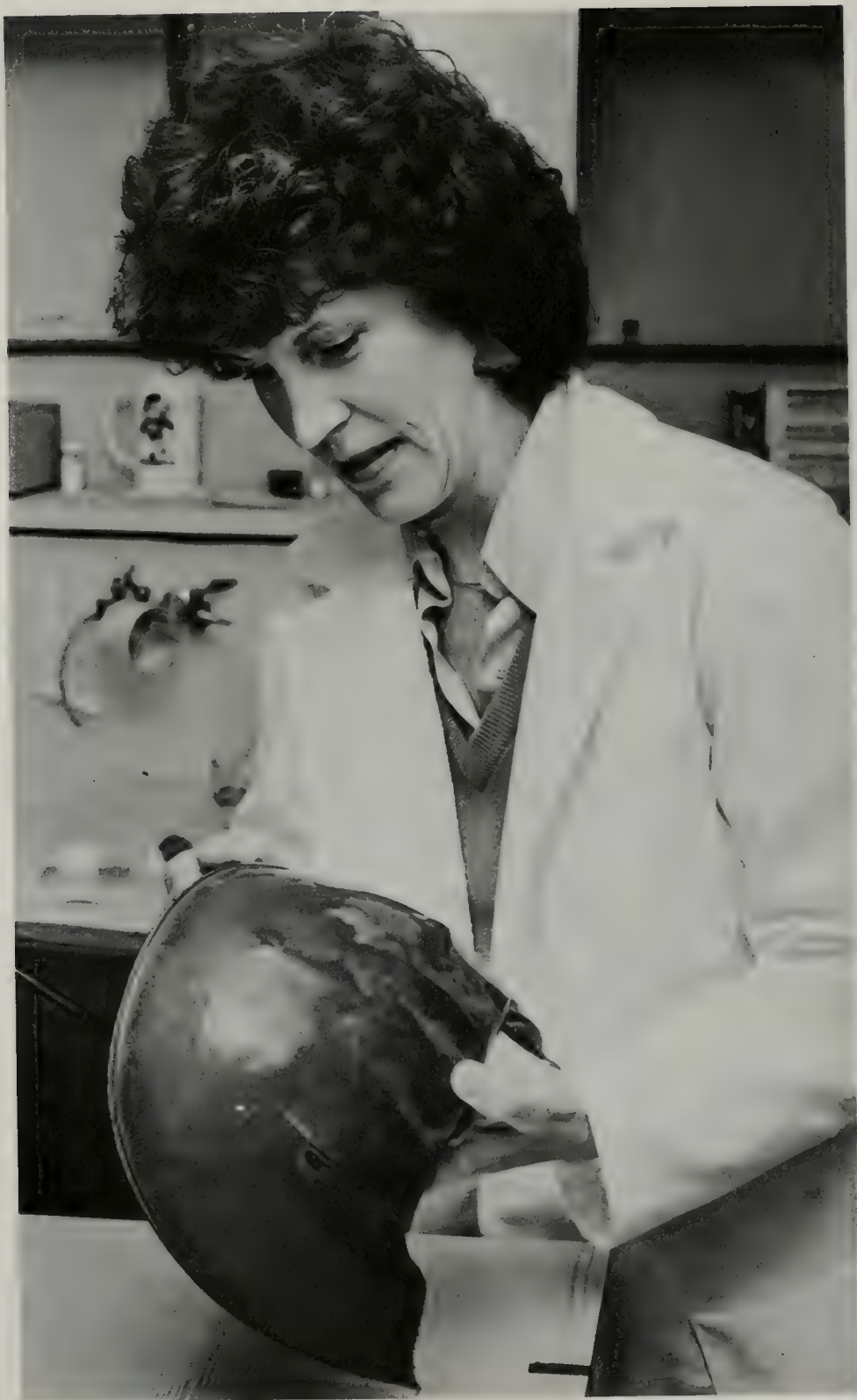


Duration of Program

The length of time a graduate student spends in study toward an advanced degree depends upon the requirements of the individual program, on personal work habits, and on the environment of the graduate school and the department in which the study is conducted.

The student's level of preparation before entering graduate school has a direct bearing on the speed with which the degree may be earned. A student who enters with proficiency in one or more foreign languages and a good foundation in the chosen field may well be able to finish within the minimum time limits. On the other hand, the student who is not as well prepared may find that one and a half to two years are the minimum for the A.M. degree, and four to five years for the Ph.D. degree (although wise use of the summers may reduce this time somewhat). The total time may also be lengthened if the student must work during part of the period of residence.

The attitude of the graduate school and its various departments will also affect the time needed to complete the degree. During the last decade the average time elapsing between entering graduate school and receiving the doctorate in American universities has been about ten years. At Duke the average doctorate in the humanities requires a little over seven years, nearly six years in the social sciences, and slightly over four years in the sciences. Over the last few years, Duke University has been among the forerunners in reducing even further the time needed to obtain the Ph.D. without any sacrifice in quality. This effort has taken the form of trying to eliminate the unnecessary delays, particularly those due to financial burdens on the student. Duke ranks among the leading institutions in the country today in terms of financial aid per student from university sources. Moreover, much of this aid is in the form of fellowships and scholarships which do not require burdensome services in return. The large public institutions are often more restricted to awards which require substantial teaching, research, or other duties, thus reducing the speed with which a student can complete the resident course work. A student will be wise to inquire to what extent progress toward a degree may be delayed by the work entailed in certain awards. If, for example, an assistantship lengthens unduly the time necessary to obtain a degree, a smaller fellowship may be preferable. The duration of the graduate program depends on several factors, but the policy of the Duke Graduate School is to keep the length of time a student is involved in obtaining an advanced degree at a minimum.



Duke University Graduate School

Teaching and Research

In surveying the progress made in the first seven years after the founding of Duke University, its first President, William Preston Few, wrote that he wanted "to see the Graduate School made strong because it will best and most quickly ensure our attaining and maintaining a place of real leadership in the educational world." President Few believed that "more than anything else here our Graduate School will determine the sort of University we are to build and its standing in the educational world." This conviction has continued to prevail to the present day, with emphasis upon the interdependence of teaching and research as the necessary components of scholarship.

Over 700 members of the graduate faculty teach the approximately 900 courses and seminars offered in the Graduate School and supervise thesis and dissertation research. Many of the major universities of the world have helped to train this faculty; approximately 90 percent of the graduate staff hold degrees from the 52 institutions which make up the Association of Graduate Schools within the Association of American Universities. By place of birth, the faculty represent almost every state in the nation and almost two dozen foreign countries.

The groundwork for learning may be laid in privacy—indeed a certain amount of private study and research is absolutely essential—but the vital stimulus to the learning process comes from one's contact with the minds of other people with similar or related interests. This is precisely why graduate schools are highly selective in their admissions policies, and it is one of the important reasons for their willingness to offer attractive fellowship awards to outstanding students. The superior student is a valuable catalyst both for fellow students and for faculty and is prized as such.

Faculty and students comprise the essential human factor in education, but their joint endeavor cannot prosper without adequate research and library facilities. Duke University has research facilities for physics, botany, zoology, chemistry, psychology, sociology, engineering, and biochemistry, as well as well-equipped laboratories in the various departments of medical science. They have been built entirely, or modernized and expanded, within recent years. The University has an excellent Computation Center on the campus and shares a computing facility with the University of North Carolina and North Carolina State University. The Triangle Universities Computation Center is among the largest research-oriented computer facilities in the world. The University has an excellent research library. In number of volumes, serials, and documents, and

in breadth of coverage, the library offers more resources than many graduate schools with enrollments two or three times Duke's size. To the student in the arts, humanities, or social sciences, this is an immeasurable asset.

Among the many special features of the Graduate School a few important examples may be mentioned. For students in the biological and physical sciences, the facilities of the Duke Marine Laboratory at Beaufort, North Carolina, are available for course work and research. The laboratory has research buildings, classrooms, research vessels, and living quarters which make it an excellent research center in marine biology. Closer to home are the 8,300 acres of Duke Forest, managed by the School of Forestry and Environmental Studies, ideal for research on timber growth, soils, and related topics. A regional nuclear structure laboratory is housed on the campus and serves the major universities in the area. The phytotron, adjacent to the botany greenhouses, is an integrated series of plant-growth rooms, chambers, and greenhouses, with forty-six separately controlled environments providing more than 4,000 square feet of plant-growing space. The environmental factors controlled in the units for the study of plant growth include light, temperature, nutrients, carbon dioxide concentration, and humidity.

Additional resources and facilities are available to the graduate student through Duke's fine Schools of Law, Business, Medicine, Engineering, Forestry and Environmental Studies, and the Divinity School. A two-term summer session and the availability of courses at the nearby University of North Carolina at Chapel Hill, North Carolina Central University in Durham, and North Carolina State University in Raleigh, under a cooperative arrangement, offer other opportunities to the graduate student.

No description of programs can begin to give the prospective student the full flavor of graduate study in a particular institution. If practical, a visit to the universities in which one is interested is always helpful. The Duke Graduate School offers a warm invitation to prospective students to come to the campus during the year to discuss their possible application and admission.

The visitor will find at Duke most of the facilities that one could hope for in the largest of institutions, and yet the University has been fortunate in avoiding many of the evils that seem inevitable with mass education. Despite a total University enrollment of approximately 9,500, Duke has retained the sense of community that one usually associates with a small liberal arts college. And in an age when current architectural whim often adds yet another stylistic variant to an already eclectic array of buildings, Duke has built a campus of unusual and architecturally coherent beauty. This, too, is an important part of education, creating an environment conducive to learning.

Special Programs

Center for the Study of Aging and Human Development. The primary aims of the center are to encourage and support basic and applied research on biomedical, behavioral, and social scientific aspects of adult development and aging; to train investigators for such research; to provide clinical training in geriatrics for health professionals; and to develop sources of scientific information which are accessible to interested individuals, organizations, and governmental agencies. Although the center does not offer degrees, the varied programs, research laboratories, and clinical settings provide a context and resource for undergraduate and graduate students and for health professionals with special interests in adult development and aging. Inquiries should be addressed to Harvey Jay Cohen, M.D., Director, Duke University Center for the Study of Aging and Human Development, Box 3003, Duke University Medical Center, Durham, North Carolina 27710.

Asian-Pacific Studies Institute. The institute sponsors an agenda of visiting speakers and scholars and coordinates study abroad programs in China and Japan. A limited number of fellowships are granted which provide stipends for a two-year period. Fellows will be expected to reach the equivalent of third-year level of proficiency of language

training during the term of their award. Incoming graduate students with the Ph.D. as their objective, students in good standing in the first year of study in Duke professional schools, and current Duke students enrolled in Ph.D. programs may be considered for these fellowships. Further information may be obtained from The Asian-Pacific Studies Institute, 2111 Campus Drive, Duke University, Durham, North Carolina 27706.

The Center for Biochemical Engineering. The Center for Biochemical Engineering offers versatile and broad education at the graduate level for students interested in developing and using engineering principles to understand and implement biological and biochemical processes. The programs of study in biochemical engineering are thus interdisciplinary. Students follow a program of course work to reinforce advanced principles of chemical process engineering, mathematics, and physics, as well as microbiology, biochemistry, immunology, and genetics. Close relations are maintained with many departments and schools of the University, and research projects involving work in these other departments are encouraged. Major emphasis is placed on study leading to the Ph.D., the traditional degree of scholarship awarded for mastery of a significant field of knowledge. This mastery is demonstrated by a combination of course work in a major and minor field, completion of an original research project submitted as a dissertation, and a successful defense of the research. Programs leading to the Master of Science degree are also available. Students from non-engineering programs are encouraged to apply to either degree program. Further information may be obtained from the Director of Graduate Studies, The Center for Biochemical Engineering, Teer Engineering Building, Duke University, Durham, North Carolina 27706.

Canadian Studies Program. The purpose of the program is to increase American knowledge and understanding of Canada by formalizing and expanding graduate interest in Canada, introducing the study of Canadian life and culture at the undergraduate level, and encouraging such study in primary and secondary schools. The program awards a limited number of graduate fellowships and teaching assistantships to resident or incoming graduate students who undertake a dissertation topic on Canada or Canadian-American relations; sponsors lectures by Canadian specialists; and supports seminars devoted to Canada. Inquiries should be addressed to the Director, Canadian Studies Center, 2016 Campus Drive, Duke University, Durham, North Carolina 27706.

The University Program in Cell and Molecular Biology. This program centralizes the cell, developmental, and molecular biology research training found in eight of the University's departments: anatomy, biochemistry, botany, microbiology and immunology, pathology, pharmacology, physiology, and zoology. Prospective students may either apply to one of the participating departments, or apply directly to the program and designate a departmental preference. Applications for admission and fellowship support must be received by February 1, but early applications may receive advanced consideration. Inquiries should be addressed to Dr. Bernard Kaufman, The University Program in Cell and Molecular Biology, Box 3711, Duke University Medical Center, Durham, North Carolina 27710.

Continuing Education. Local adult residents may pursue graduate academic study at Duke as nondegree students through the Office of Continuing Education, which will provide both academic and career counseling to such students. Up to 12 graduate credits earned by a nondegree Continuing Education student in graduate courses taken at Duke before full admission to the Graduate School may be carried over into a graduate degree program if (1) the action is recommended by the student's Director of Graduate Studies, (2) the work is not more than two years old, and (3) the work is of G level or better. GRE workshops are also offered regularly. Information and applications may be obtained from the Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708.

Cooperative Programs with Neighboring Universities: Library Exchange. Through a cooperative lending program, graduate students of the University of North Carolina and Duke University are granted library loan privileges in both universities.

Cooperative Program in Russian and East European Studies. The graduate schools of Duke University and the University of North Carolina offer a cooperative program leading to the A.M. and Ph.D. degrees in several disciplines (economics, history, literature, linguistics, political science, and sociology), with a concentration in Russian and East European studies. Students admitted to one institution are encouraged to enroll in courses advantageous to their programs at the other institution, to utilize the libraries and facilities of both universities, and to participate in the periodic colloquia involving the personnel of the two institutions and distinguished visiting scholars. For information, contact Professor Martin Miller, Department of History, Duke University, Durham, North Carolina 27706.

Center for Demographic Studies. The facilities of the center, located at 2117 Campus Drive, include a population library, the Joseph J. Spengler Collection of publications and research materials, and extensive data resources. These are available to the entire Duke community. The center does not offer degrees; it promotes the pursuit of advanced degrees, with a specialization in population studies, through either the Department of Sociology or the Department of Economics. The center's program provides opportunities for direct student participation in ongoing research projects. The program of extramural research stresses, but is not limited to, work in the demography of aging, health, mortality, fertility, and migration. Inquiries for training and research opportunities may be directed to Dr. George C. Myers, Director, Center for Demographic Studies, 2117 Campus Drive, Durham, North Carolina 27706.

Center for Environmental Engineering. The purposes of the Center for Environmental Engineering are to focus attention on pressing environmental problems, to provide orientation and educational opportunities in technical environmental subjects for both students and faculty, and to promote interdisciplinary environmental engineering research. The center sponsors a visiting speaker program and graduate and faculty seminars, and coordinates graduate and undergraduate courses in environmental engineering. Further information may be obtained by writing or visiting the Center for Environmental Engineering Office, 133 School of Engineering, Duke University, Durham, North Carolina 27706.

The University Program in Genetics. This is an interdisciplinary program with a faculty drawn from several of the biological science departments (anatomy, biochemistry, botany, microbiology and immunology, zoology), and is designed to meet the needs of students with a variety of educational backgrounds and professional objectives who are interested in specializing in the field of genetics. Interested students should apply for admission to the department of their choice, and after being admitted make arrangements to participate in the program. For information, consult Dr. J. Antonovics, Director, The University Program in Genetics, 132 Biological Sciences Building, Duke University, Durham, North Carolina 27706.

Master of Arts Program in Humanities. This interdepartmental program centered in the humanities and leading to the A.M. degree is designed for students whose interests cross disciplinary lines and are not easily met by departmental programs. Students select a set of thematically related courses from the graduate level offerings of humanities departments, and, where appropriate, from other departments as well. The interdepartmental committee which manages the program offers aid in tailoring a set of courses to the individual student's needs, approves the program chosen, and provides ongoing supervision. Information on program requirements and admission may be found in the chapter on "Advanced Degree Programs." Additional information may be obtained

by writing the Director of Graduate Studies, Master of Arts Program in Humanities, The Graduate School, 127 Allen Building, Duke University, Durham, North Carolina 27706.

Duke University International House. International House is the center of cocurricular programs for the more than four hundred students from sixty-six countries who are presently enrolled at Duke. Programs which assist students from abroad in participating in the life of the Durham and Duke communities include: an intensive orientation program at the beginning of the academic year; the International Friends Program (formerly Host Family Program), in which interested international students may become acquainted with American families; the Duke Partners Program which pairs an American and visiting partner for weekly meetings to practice English and to learn about each other's cultures; the International Wives Club, which provides a structure for international women to meet with American women in an informal atmosphere; the Speakers' Bureau, which arranges for international students to speak at civic and social groups as well as schools in the Durham community; intermediate level English conversation and grammar classes which meet twice a week; the Friday coffee break in the basement of the Chapel which is sponsored by Campus Ministry especially for internationals and friends. The International Association is a student organization which includes a significant number of American members, as well as international students. The Association plans social and cultural programs which emphasize personal contact and the informal exchange of ideas among students from diverse backgrounds. Included are weekly open-houses with lectures, films, pot-luck dinners, or parties; periodic trips outside of Durham; and an annual International Day on campus which draws visitors from throughout the area. Additional information may be obtained by writing to Carlisle C. Harvard, Director, International House, 2022 Campus Drive, Duke University, Durham, North Carolina 27706.

Islamic and Arabian Development Studies. This program, begun in 1977 with the assistance of grants from the government of Saudi Arabia and some twenty corporations in the United States, sponsors conferences and research on Islamic themes with special reference to developmental problems of the Arabian peninsula. The program has supported courses and seminars on the language, art, and contemporary problems of the Islamic world. It sponsored student delegations to the annual Model Assembly of the League of Arab States in Washington, D.C. The 1984 delegation won the highest number of awards given to any participating university. Twelve faculty members from outreach colleges were awarded fellowships for study in Cairo and six Duke faculty were given fellowships for study in Jordan in 1984. The program was the recipient of a bequest by the late Joseph J. Malone of his library in Arabian affairs. The program also arranged for acquisition by Perkins Library of the Louis and Nancy Hatch Dupree Collection on Islamic Central Asia. The program has sponsored four international conferences, two at Duke, one at Kiawah Island and the fourth at the Rockefeller Foundation Conference Center, Bellagio, Italy. The program also sponsors an outreach program which includes Appalachian State University, Belmont Abbey College, the College of Charleston, Converse College, Davidson College, Johnson C. Smith University, Old Dominion University, and the University of the South. Inquiries should be addressed to Dr. Ralph Braibanti, Director, Islamic and Arabian Development Studies, 2114 Campus Drive, Duke University, Durham, North Carolina 27706.

Latin American Studies Program. The Graduate School offers an interdepartmental program in Latin American studies in conjunction with several departments. Students apply to the Departments of Anthropology, History, Economics, Political Science, Sociology, or Romance Languages, fulfilling the requirements of those departments and writing their A.M. and Ph.D. degrees under their auspices. In consultation with the candidate, a faculty committee will determine a special program of study giving the candidate rigorous training in the Latin American field in addition to their disciplinary training. The holdings of the Perkins Library for graduate work and research in Latin-American

history, inter-American relations, economic history, politics, art, and Spanish-American literature are constantly being enlarged. Program faculty are involved in different national research programs dealing with Latin American topics and offer advice on fellowship support for graduate research in Latin America and the Caribbean. Inquiries should be directed to the Council on Latin American Studies, Center for International Studies, 2122 Campus Drive, Duke University, Durham, North Carolina 27706.

Master of Arts in Liberal Studies. The Master of Arts in Liberal Studies is an interdisciplinary program that allows individuals with a variety of professional and personal educational interests the flexibility to pursue those interests across traditional disciplinary boundaries. The program is managed by an interdepartmental committee which advises students and directs their course of study. Students will study primarily on a part-time basis and will choose from an array of interdisciplinary courses developed specifically for this program. In addition, the students will select other graduate-level courses that fit their individual needs and interests. For further information, call or write the Director, Master of Arts in Liberal Studies Program, Room 120 Allen Building, Duke University, Durham, North Carolina 27706, (919) 684-3222.

The Ph.D. Program in Literature. The doctoral Program in Literature at Duke has as its goals the education of men and women who will be fully qualified to teach in departments of national literatures as well as in Humanities and other interdisciplinary programs. The Program is not comparatist in the traditional sense but theoretical in focus, dedicated to the understanding of cultural history and the reshaping of literary studies in the context of contemporary thought. All the literature departments cooperate in this program and its students have access to all courses given under the auspices of the graduate faculties in the humanities. A full descriptive brochure is available. To obtain the brochure or other information, contact Dr. Annabel Patterson, Director of Graduate Studies, Ph.D. Program in Literature, 305 Carr Building, Duke University, Durham, North Carolina 27706.

Medical Historian Training Program. Conducted under the auspices of the School of Medicine and the Graduate School, this program requires a minimum of six years of graduate study for the M.D.-Ph.D., and four or five years for the M.D.-A.M. The M.D.-Ph.D. program is intended for those students who know that their major career effort will be in teaching and other scholarly activities in the history of medicine (not necessarily to the total exclusion of clinical medicine). The M.D.-A.M., on the other hand, is appropriate for those who are undecided, but who wish to acquire a firm foundation for future study, or for those who are seriously interested in pursuing an avocation in the history of medicine. Applicants must meet the requirements for admission to the School of Medicine and the Graduate School in the Department of History. Inquiries should be addressed to Dr. Peter English, Director, Medical Historian Training Program, Box 3420, Duke University Medical Center, Durham, North Carolina 27710.

Medical Scientist Training Program. This program is conducted under the auspices of the Graduate School and the School of Medicine and is designed for students with a strong background in science who are motivated toward a career in the medical sciences and academic medicine. It provides an opportunity to integrate graduate education in one of the sciences basic to medicine with the clinical curriculum of the School of Medicine, and usually requires six to seven years of study leading to both the M.D. and Ph.D. degrees. Interested students should apply for admission to both the Graduate School and the School of Medicine. Additional information may be obtained by consulting Dr. Salvatore Pizzo, Director, Medical Scientist Training Program, Department of Pathology, Box 3712, Duke University Medical Center, Durham, North Carolina 27710.

Program in Medieval and Renaissance Studies. This program is administered by the Duke University Center for Medieval and Renaissance Studies. A participating student is enrolled in one of the regular departments and fulfills the Ph.D. requirements

for that discipline while taking a program of electives which will advance his or her interdisciplinary competence in the medieval or Renaissance areas. Such a program may include a choice from the fields of art history, language and literature, history, philosophy, and religion. Participation in the program will fulfill the Graduate School requirement for work in a related field. Inquiries should be addressed to the Director of Graduate Studies, Duke University Center for Medieval and Renaissance Studies, Box 4666, Duke Station, Durham, North Carolina 27706.

The University Program in Neurobiology. This interdisciplinary program was developed in response to recent advances in neurobiology which have resulted in closer ties among the various approaches to studying the nervous system. The program is designed for students who wish to study the nervous system at several levels ranging from the molecular to the behavioral, and students will be advised to take courses in neuroanatomy, neurophysiology, neuropharmacology, and neuropsychology. The heart of the training is a research apprenticeship that leads to a Ph.D. dissertation. Inquiries should be directed to Dr. Irving T. Diamond, Director, University Program in Neurobiology, Department of Psychology, Duke University, Durham, North Carolina 27706.

Oak Ridge Associated Universities. Duke University is one of the sponsoring universities of the Oak Ridge Associated Universities located at Oak Ridge, Tennessee. The graduate research program at Duke has available to it all of the facilities of the Oak Ridge National Laboratory and the cooperative supervision of student research by the staff at Oak Ridge. Fellowships in several fields of science are available to qualified applicants. Further information may be obtained from Judith Argon, Office of Research Support, 001E Allen Building, Duke University, Durham, North Carolina 27706.

Institute of Policy Sciences and Public Affairs. See Public Policy Studies in the chapter on "Advanced Degree Programs" in this bulletin.

Center for Resource and Environmental Policy Research. Housed in the School of Forestry and Environmental Studies, the center combines the efforts of a small permanent faculty with participation by business leaders, government officials, and the faculty and students of Duke University and other universities to provide a center of excellence for the analysis of contemporary resource and environmental policy issues, a forum for the examination of public and private responsibilities for natural resources and the environment, and a link between the specialized knowledge of academia and the information needs of government and industry. Graduate research assistantships are offered to qualified students researching resource and environmental policy problems. Support is available to students pursuing M.S., A.M., or Ph.D. degrees through the Graduate School at Duke University and in conjunction with the School of Forestry and Environmental Studies or other departments. Course work is offered in both intensive (one to three weeks) and semester-long formats. For further information, write to Dr. William Hyde, Center for Resource and Environmental Policy Research, 102 Biological Sciences Building, Duke University, Durham, North Carolina 27706.

The University Program in Toxicology. This interdepartmental program provides graduate students and postdoctoral fellows with an opportunity for a strong education in toxicology through support of courses, seminars, and research. The objectives of program members are to understand and devise controls for those toxicological phenomena having direct effects on human life and health, to train scholars who will advance the science of this discipline, and to provide a forum for faculty and student discussion of recent research developments. The faculty of the toxicology program is drawn from anatomy, biochemistry, chemistry, forestry and environmental studies, microbiology and immunology, pathology, pharmacology, physiology, zoology, and several departments in the School of Medicine. Current areas of research include pulmonary toxicology, neurotoxicology, immunotoxicology, carcinogenesis, and biochemical toxicology. Students may base their training in general toxicology, ecotoxicology, or any area in which the

faculty is currently involved. Prospective graduate students may apply to the program directly or to one of the participating departments, and must be admitted both to the department and to the program. Information on fellowship support and application procedures may be obtained from Dr. Doyle G. Graham, Director, University Program in Toxicology, Box 3712, Duke University Medical Center, Durham, North Carolina 27710.

Organization for Tropical Studies. Duke University is a member of an international consortium created to promote an understanding of tropical environments through research and research-training programs in the tropics. A basic eight-week OTS course in tropical biology is conducted twice a year, and advanced course offerings are scheduled periodically in agriculture, botany, forestry, geography, and zoology. For information, consult Dr. Donald Stone or Dr. Richard White, Department of Botany; or Dr. John Lundberg, Department of Zoology; Duke University, Durham, North Carolina 27706.

Short Courses and Conferences. Short courses, institutes, and conferences are conducted throughout the year by the Office of Continuing Education. Some are residential, others are designed for local participants; some carry continuing education units (CEU). Programs include the Duke Young Writers' Camp, Writers' Conferences, and Product Safety Seminars. Contact Dr. Judith Ruderman, Director, Office of Continuing Education, The Bishop's House, Duke University, Durham, North Carolina 27708, for brochures describing current offerings.

Duke Summer Festival of the Arts. The Duke Summer Festival of the Arts is part of the Summer Session and arranged by the Office of Cultural Affairs which coordinates the arts in the summer. This festival provides an exciting, artistically stimulating environment for the campus and community. Performances of the Ciompi Quartet, Duke's well-known Chamber Music Ensemble, and other special events are planned each summer. Distinguished artists and scholars are also involved in cocurricular sessions. The Summer Theater Institute, established for students seriously interested in theater, offers intense professional-level training that does not fit the regular school year's activities. Institute instructors are working theater professionals with extensive teaching experience. Professional actors, directors, and playwrights involve students in developing new scripts through rehearsals and readings. In addition, the six-week American Dance Festival program offers a wide variety of classes, performances, and workshops.

For more information, please contact the following:

Duke Summer Festival of the Arts, Summer Session Office, Duke University, 121 Allen Building, Durham, North Carolina 27705.

The Summer Theater Institute, Duke University, 206 Bivens Building, Durham, North Carolina 27708.

American Dance Festival, Duke University, Box 6097 College Station, Durham, North Carolina 27708.

General Regulations Governing Graduate Studies

The official, detailed *Bulletin of Duke University: Graduate School*, published in March of each year, gives an account of regulations concerning graduate work at Duke University and a full description of course content. The following pages are a summary of these materials for 1988-89 and should provide sufficient information, together with the application packet, for the prospective student. The bulletin is normally mailed to each student who is admitted to the Graduate School in the late spring of the year of matriculation so that the course program may be planned for the first year.

Admission

All students seeking a graduate degree from Duke University must formally be admitted to the Graduate School. Applicants are considered without regard to race, color, religion, sex, age, handicap, or national origin.

Prerequisites for admission include a bachelor's degree (or the equivalent) from an accredited institution. The student's undergraduate background should be well-rounded and of high quality, indicating ability for graduate study. Ordinarily the student should have majored in the area of intended graduate study. Many departments (see the section on "Advanced Degree Programs") list specific prerequisites. Satisfactory scores on the Graduate Record Examination are required by all departments.

Many graduate departments will consider applications from students wishing to pursue degree study on a full-time or part-time basis. (Consult application materials for listing of departments.) Admission requirements, procedures, and deadlines are the same for both full- and part-time students. Part-time study requires a minimum registration of 3 units per semester, and while it is possible to obtain the master's degree on a totally part-time basis, the Ph.D. degree does require a minimum of one year of full-time residence. Additionally, students must maintain continuous registration from entry into the Graduate School to completion of degree. Time limits for completion of degrees are the same for both full- and part-time students. Financial aid through Duke University is not available to part-time students (except during their year of full-time residence). Visa restrictions do not allow nonimmigrant students to pursue graduate study on a part-time basis.

Students who do not intend to earn an advanced degree at Duke, but who wish to take graduate courses, may apply for nondegree admission. Such admission is granted in three different categories: (1) admission as a regular nondegree student in the Graduate School, which involves application to a particular department and fulfillment of standard application procedures and requirements; (2) admission as a special nondegree student through the Office of Continuing Education in conjunction with the Graduate School, without departmental affiliation, following special application procedures; and (3) admission as an unclassified student in the summer session only, requiring application to the Director of the Summer Session.

Procedures. A student seeking admission to the Graduate School should obtain an application packet from the Graduate School Admissions Office. (Note: Persons interested in the Master of Arts in Liberal Studies should contact that program directly for information, requirements, and special application materials.) This packet contains the necessary forms and detailed application instructions. The application form and accompanying Summary Data sheet must be filled out completely, signed, and returned to the Graduate Admissions Office accompanied by a nonrefundable fee of \$50 in U.S. currency (check or money order payable to Duke University). In addition, the student must provide the following supporting documents: (1) two copies of the official, confidential transcript from each post-secondary institution attended sent directly to the Graduate School by the institution; (2) three letters of evaluation from persons best qualified to judge the applicant as a prospective graduate student, written on the forms provided and returned by the applicant in the confidential envelopes that have been sealed-then-signed by the evaluators (or returned directly to the Graduate School by the evaluator); (3) official scores on the Graduate Record Examination General Test for applicants to all departments; and (4) official scores on the Graduate Record Examination Subject Test for applicants to certain specified departments (see application materials).

Students applying for fall admission and award should take the Graduate Record Examination no later than the October testing in the previous year to meet our deadlines. Information on the times and places of the Graduate Record Examination can be provided by the applicant's college or by the Educational Testing Service, CN 6000, Princeton, New Jersey 08541-6000.

Applications cannot be reviewed until all supporting documents are on file. *Materials submitted in support of an application are not released for other purposes and cannot be returned to the applicant.*

Fully qualified students from outside the United States may apply for admission to full-time study in the Graduate School. The foreign student must, in addition to the

information required of all students, submit the following materials with the application: (1) if the student's native language is not English, certification of English proficiency demonstrated by official scores from the Test of English as a Foreign Language (TOEFL), administered through the Educational Testing Service, CN 6155, Princeton, New Jersey 08541-6155 (the Graduate School requires a score of 550 or higher on the TOEFL); (2) a statement showing financial arrangements for the proposed term at Duke (estimated costs per calendar year are about \$18,500). Foreign students may apply for full-time study only.

During new matriculants' first registration period at Duke, every foreign student whose native language is not English will be required to take a test to verify competence in the use of oral and written English. Until such competence is determined, admission and arrangements for an award involving teaching must remain provisional. Students found to lack the necessary competence should be prepared to undertake additional English language instruction. Students who do not perform satisfactorily on the test for competence in oral and written English by the end of their first year of residency will not be permitted to continue graduate work at Duke University. Please note that the competency test does not take the place of the TOEFL 550 requirement, nor does passing the competency examination meet degree requirements for a foreign language.

It is the applicant's responsibility to make certain that the Graduate School Office has received all required materials before the specified deadlines, which are outlined at the close of this chapter and detailed in the application materials. To ensure that the Admissions Office will have adequate time to assemble all items submitted on an applicant's behalf, applications should be submitted at least two weeks before the deadline. Only complete applications can be considered. Anyone whose folder is not complete by the deadline will face the possibility that departmental enrollment will have been filled and that all financial aid funds will have been committed based on applications that were complete as of the deadline.

Applicants who are admitted will be offered full admission, provisional admission, or nondegree admission and will receive a letter of admission from the Dean of the Graduate School and an acceptance form. Admission to the Graduate School is offered only by the Dean. The process of admission is not complete until the student returns the acceptance form. An admission offer is only for the semester specified in the letter of admission, and admission may not be deferred automatically from one term to another. Provisional admission for a trial period of one semester or a minimum of 12 hours of course work is offered to students who appear to warrant admission but do not comply fully with admission requirements. Graduate credit earned under provisional status may be applied toward an advanced degree at Duke University if and when the student is granted full admission. Nondegree admission is offered to students who meet the admission requirements and who desire to engage in graduate study not subject to the restrictions of a graduate degree program. With the approval of the student's major department and the Dean of the Graduate School, a maximum credit of 12 graduate units earned under nondegree status may be applied toward an advanced degree at Duke University if and when the student is granted full admission.

Immunizations. North Carolina Statute G.S. : 130A-155.1 states that no person shall attend a college or university, public, private, or religious, excluding students attending night classes only and students matriculating in off-campus courses, unless a certificate of immunizations against diphtheria, tetanus, whooping cough, poliomyelitis, red measles (rubeola), and rubella is presented to the college or university on or before the first day of matriculation. The required forms and instructions are provided to students in the packet of materials sent with the letter of admission.



Earning the Degrees

Duke University offers graduate programs leading to the specified advanced degrees in the following fields:*

Anatomy, Ph.D.
Anthropology, Ph.D.
Biochemical Engineering, M.S., Ph.D.
Biochemistry, Ph.D.
Biomedical Engineering, M.S., Ph.D.
Botany, A.M., M.S., Ph.D.
Business Administration, Ph.D.
Chemistry, Ph.D.
Civil and Environmental Engineering,
M.S., Ph.D.
Classical Studies, A.M., Ph.D.
Computer Science, M.S., Ph.D.
Economics, A.M., Ph.D.
Electrical Engineering, M.S., Ph.D.
English, Ph.D.
Forestry and Environmental Studies,
A.M., M.S., Ph.D.
Geology, M.S., Ph.D.
Germanic Languages and Literature,
A.M.
Health Administration, M.H.A.
History, A.M., Ph.D.

Humanities, A.M.
Liberal Studies, A.M.
Literature, Ph.D.
Mathematics, A.M., M.S., Ph.D.
Mechanical Engineering and Materials
Science, M.S., Ph.D.
Microbiology and Immunology, Ph.D.
Music, A.M., Ph.D.
Pathology, M.S., Ph.D.
Pharmacology, Ph.D.
Philosophy, A.M., Ph.D.
Physical Therapy, M.S.
Physics, A.M., Ph.D.
Physiology, Ph.D.
Political Science, A.M., Ph.D.
Psychology, Ph.D.
Public Policy Studies, A.M.
Religion, A.M., Ph.D.
Romance Languages, A.M., Ph.D.
Sociology, A.M., Ph.D.
Zoology, Ph.D.

The Language Requirement

Although individual departments establish their own requirements (see individual departmental headnotes in the section on "Advanced Degree Programs"), the regulations of the Graduate School require no foreign language for the master's degree or for the Ph.D. degree. The languages normally required by departments are French, German, and Russian, but others may be offered if appropriate and approved.

The foreign language may be satisfied in the following ways: (1) by a passing score on one of the Graduate School Foreign Language Test (GSFLT) examinations administered at any national center prior to entering Duke or at Duke University after matriculation and taken no longer than six years before the preliminary examination, (2) by transfer from another institution, with the limitations set forth in the more detailed *Bulletin of Duke University: Graduate School*, (3) in any language for which GSFLT tests are not available, by a reading examination administered by a qualified examiner and arranged by the Graduate School office, or (4) by a reading examination in any foreign language, administered by a qualified member of the faculty under a procedure specified by the department and approved by the Dean and the Executive Committee of the Graduate Faculty.

Advanced level, noncredit, reading courses in French and German are provided for students who need them.

Foreign students whose native language is not English may, with the approval of the Director of Graduate Studies in their major department, substitute English for a foreign language required by their department for a master's or doctoral program.

Other Requirements

The general requirement for a master's degree is a minimum of 30 units (semester

*Students interested in additional information on departmental programs not furnished in the *Bulletin of Duke University: Graduate School* should contact the Director of Graduate Studies in the appropriate department.

hours) of course-seminar-research credit. The student must present acceptable grades for a minimum of 24 units of graduate courses. The nature of the additional 6 units for which students must register depends on whether they are enrolled in thesis or nonthesis programs; i.e., these last 6 units are earned either with successful submission of the thesis or with such other courses or academic exercises as are approved by the student's department.

A master's program can be completed in one academic year, but the student who presents a thesis usually needs at least a calendar year, and foreign students should be prepared to study for two years. The maximum length of time permitted from first registration to completion of all requirements is six years. Under certain circumstances a maximum credit of 6 units may be transferred toward the master's degree for graduate courses completed elsewhere, provided the grades earned in the particular courses were not less than B or the equivalent. In such a case, however, the transfer of graduate credit does not reduce the required minimum registration for a master's degree at Duke.

The course-seminar-research requirement in the doctoral program is 60 units, but the proportions of course-seminar work and research are generally flexible, based on individual needs. Those applicants with master's degrees, after establishing quality work here, may be granted transfer credit up to a maximum of 15 units. The dissertation is expected to be a mature and competent piece of writing, embodying the results of original and significant research. All dissertations will be published on microfilm and the author may retain copyright privileges.

Time limitations are set for the completion of the doctoral program. The preliminary examination, which may be taken only after language, course-seminar, and residence requirements have been met, formally admits a student to candidacy for the degree. This examination should be passed by the end of the third year of doctoral study. The interval between preliminary examination and presentation of an acceptable dissertation should ordinarily be one to two years and may not be more than four years without special approval by the Dean. Should this interval extend beyond five years, a second preliminary examination usually becomes necessary.

Financial Information*

Tuition and fees are charged at the rate of \$300 per unit (a unit is equivalent to a semester hour), with the normal full program of study being 24 units for an academic year. The basic necessary expenses for a year of graduate study, assuming one lives in University graduate housing, are approximately as follows:

Registration Fee	\$ 600
Tuition	7,200
Health Fee	238
Room Rent†	
(Central Campus Apartments)	2,896
Meals‡	2,344

†Depending upon accommodations chosen.

‡Cafeteria estimate.

Normally, a doctoral student will not pay tuition beyond 60 units of degree credit. Additional allowances should be made for books, laundry, and other personal expenditures.

Apartment accommodations for graduate and professional students are available in the Central Campus Apartments, the Town House Apartments, and modular homes, all of which are conveniently located close to East and West Campus. Two- and three-bedroom apartments are available furnished or unfurnished. In addition to University

*The figures contained in this section are subject to change prior to the beginning of the fall, 1988, semester.

housing, the Central Campus office maintains an off-campus listing service which provides a list of privately owned homes, apartments, duplexes, and efficiencies for rent in Durham.

Duke University does not have a deferred payment plan for tuition, fees, and other charges. Students are expected to pay tuition and fees at the time of matriculation unless they plan to pay via payroll deduction from payments received for fellowships, assistantships, or employment. Graduate students who receive payments from the University and who plan to pay tuition and fees and/or campus housing charges via payroll deduction must make arrangements in the Bursar's office for such deduction.

Financial Aid. In recent years at Duke about two-thirds of all full-time students have held an award of some type; about one-third of these were aided by Duke funds and the other two-thirds by funds from other sources. Part-time students are not eligible for financial aid from the University.

The student who seeks financial aid from Duke University should be certain that the request for admission and award is filed not later than February 1 of the year in which September admission is sought. (The deadline is January 15 for psychology.) The application for admission, including transcripts of previous college work and letters of evaluation, is processed by the Graduate School and forwarded to the department in which the student wishes to pursue advanced work. The graduate faculty—or admissions committee—in the department reviews all applications and then makes its recommendation to the Dean for announcement in late March. The most outstanding applicants are then offered awards; the next in order of rank are placed on an alternate list for awards. Other students are offered only admission to the Graduate School. Because of multiple applications by students, a fraction of the awards offered by any graduate school are not accepted. Alternates on the award list are immediately notified, and the process continues until the available number of awards has been made.

Awards to entering students at Duke are in the form of fellowships, scholarships, and assistantships. Students holding awards usually are paid in nine equal installments beginning in late September.

James B. Duke Graduate Fellowships are provided through the Duke Endowment. Fellows are chosen from nominations made by the departments. Only outstanding applicants who are seeking the Ph.D. degree are considered. These nominations are made in late February and are judged in a competition which includes candidates from all departments granting the Ph.D. degree. The fellowships provide for payment of tuition for full registration and a stipend of \$1,000 per month for twelve months during the duration of the award. The award requires no service beyond that which is required of all students in a given department as a part of their training and is renewable each year upon satisfactory progress toward the degree at a fellowship level of quality. The total value of a James B. Duke Fellowship over the full three years of tenure is over \$60,000 at current tuition rates.

Graduate Fellowships range in value to \$19,000 for the calendar year and are made on a year-to-year basis. They are awarded upon recommendation by each department. No service is required as a prerequisite for accepting a fellowship, but all fellowship holders are expected to maintain full-time registration.

Special Graduate Fellowships for Minority Students provide for payment of tuition plus a stipend of up to \$900 per month for nine months. They are awarded to qualified applicants upon the recommendation of the department.

Graduate Scholarships provide for payment of tuition or partial tuition. Full tuition scholarships are valued at \$8,038 for the academic year. Scholarships are awarded upon the recommendation of each department.

Graduate Assistantships range in value to \$18,000 for the academic year. Assistants are normally permitted to reduce their registration to 9 units, and residence credit as a

full-time student is allowed under these circumstances. Assistantships are most common in the science departments, where the student often provides laboratory assistance to various members of the faculty. Most graduate assistants remain in residence during the summer sessions carrying research or course credit. In this way, the normal progress toward a degree is not impeded by the reduced load during the fall and spring semesters. Departmental research funds are often available to provide financial assistance during the summer.

Other graduate fellowships are available from foundations, industry, or the government. Among those at the University's disposal are: Kearns fellowships in religion, Mellon fellowships and traineeships under a grant from the Office of Education for students in the Canadian Studies Program, and Medieval and Renaissance Studies fellowships. Over 300 other traineeships and assistantships are available in the biological, physical, and social sciences under grants from the National Institutes of Health, National Institutes of Mental Health, National Science Foundation, research agencies in the Department of Defense, and other governmental agencies.

Loans. Students who anticipate the need to supplement their financial resources through loans should contact their state lending agencies or banks which provide loans through the Federally Insured Student Loan Program. Students should contact the Graduate School Financial Aid Office for information concerning obtaining the Guaranteed Student Loan if they have problems establishing residency or locating a lender in their home states.

It is the policy of the Graduate School to provide loans through the University to help students meet their educational expenses. Students with full-time status who meet the federal criteria for need and who have applied for loans from their state agencies are eligible for loans through the University. Loan funds are provided through the Federally Insured Student Loan Program and the Perkins Loan (formerly National Direct Student Loan Program). Generally, loans made from these funds or the state lending agencies bear no interest charge to qualified borrowers while they maintain student status and for a short period thereafter. Interest during the repayment period is at a generally favorable rate. The amount of a loan through Duke for first year graduate students is usually limited to the amount of tuition.

Inquiries concerning loans should indicate the department of intended matriculation and include all pertinent information concerning application to a state agency. These inquiries should be addressed to the Financial Aid Coordinator, Graduate School, Duke University, Durham, North Carolina 27706.

The costs of graduate education are high, but Duke University attempts to allocate its funds so that the superior student is able to finish work for a degree in the normal length of time regardless of personal financial resources. This is a contribution to the community of scholarship which the University is glad to bear.

The applicant who wishes further information on facilities and regulations on course programs not covered in this bulletin is invited to write to the Dean of the Graduate School, or the Director of Graduate Studies in the department of intended study.



Calendar of the Graduate School

Summer Session 1988

First Term: May 12-June 25

Second Term: June 28-August 11

Academic Year 1988-89

First Semester: August 29- December 17

Second Semester: January 12-May 6

August 23-24	Registration for first semester
August 29	Classes begin
October 14-18	Fall break
November 23-27	Thanksgiving recess
December 3-11	Reading period*
December 17	End of first semester
January 11	Registration for second semester
January 12	Classes begin
March 10-19	Spring recess
April 22-30	Reading period*
May 6	End of second semester
May 12-14	Commencement

Special Deadlines for Admission Applications

Consult current application materials for a more detailed explanation of deadlines and their enforcement.

July 15, 1988	Last day for completion of applications for admission to the fall 1988 semester (for those departments with space available)
November 1, 1988	Last day for completion of applications to the spring 1988 semester
January 13, 1989, 5:00 p.m.	Deadline for completion of applications to specified programs (see application materials), fall 1989
January 31, 1989, 5:00 p.m.	Deadline for completion of applications for admission and award to all other programs for the fall 1989 semester
April 15, 1989	Last day for completion of applications for first summer session 1989†
May 15, 1989	Last day for completion of applications for second summer session 1989†
July 15, 1989	Last day for completion of applications for admission to the fall 1989 semester (for those departments with space available)

*For 200-level courses, the length of the reading period is at the discretion of the instructor.

†Students seeking admission to the Graduate School for study in the summer session should apply to the Dean of the Graduate School and to the Director of the Summer Session.



Advanced Degree Programs

Anatomy

Professor J. David Robertson, M.D. (Harvard), Ph.D. (Massachusetts Inst. of Tech.), *James B. Duke Professor of Anatomy and Chairman*

Professor Montrose J. Moses, Ph.D. (Columbia), *R. J. Reynolds Industries Professor in Medical Education in the Department of Anatomy and Vice Chairman*

Professor Sheila J. Counce, Ph.D. (Univ. of Edinburgh), *Director of Graduate Studies*

Professors

Matt Cartmill, Ph.D. (Chicago); Harold Erickson, Ph.D. (Johns Hopkins); William C. Hall, Ph.D. (Duke); William Hylander, D.D.S. (Illinois at the Medical Center), Ph.D. (Chicago); Richard F. Kay, Ph.D. (Yale); R. Bruce Nicklas, Ph.D. (Columbia); Michael K. Reedy, M.D. (Washington); Elwyn L. Simons, Ph.D. (Princeton), D.Phil. (University Coll., Oxford)

Associate Professors

Nell Cant, Ph.D. (Michigan); Joseph M. Corless, M.D., Ph.D. (Duke); Eric L. Effman, M.D. (Indiana Univ. School of Med.); Ross D. E. MacPhee, Ph.D. (Alberta); Thomas J. McIntosh, Ph.D. (Carnegie-Mellon); Lee Tyrey, Ph.D. (Illinois)

Assistant Professors

M. Joseph Costello III, Ph.D. (Duke); Barbara J. Crain, M.D., Ph.D. (Duke); David Fitzpatrick, Ph.D. (Duke); William E. Garrett, Jr., M.D., Ph.D. (Duke); Emma R. Jakoi, Ph.D. (Duke); Michael Lamvik, Ph.D. (Chicago); Patricia M. Saling, Ph.D. (Pennsylvania); Frederick H. Schachat, Ph.D. (Stanford); Kathleen P. Smith, Ph.D. (Harvard)

Professor Emeritus

John W. Everett, Ph.D. (Yale)

Associate Professor Emeritus

Kenneth L. Duke, Ph.D. (Duke)

Adjunct Assistant Professor

David A. Kopf, Ph.D. (Chicago)

Associate Medical Research Professor

Kenneth A. Taylor, Ph.D. (California at Berkeley)

Assistant Medical Research Professors

Hie Ping Beall, Ph.D. (Tulane); Denis Raczowski, Ph.D. (Duke); Laura F. Schweitzer, Ph.D. (Washington)

Lecturer

Irving T. Diamond, Ph.D. (Chicago)

The division of Anatomy offers graduate work leading to the Ph.D. degree. A common focus on the interrelations of biological structure and function characterizes the research of the anatomy faculty, although three general departmental subdivisions are recognized: biophysical, cellular, and molecular biology; neurobiology; and physical anthropology, functional morphology, and primate evolution.

The division offers doctoral training programs designed to produce teachers and research scientists competent in a broad range of the anatomical sciences, and students with a wide variety of backgrounds and interests in the biological sciences can be accommodated within the Ph.D. degree. A reading knowledge of one foreign language is required of all doctoral students in anatomy. All students participate in the core anatomical science courses (Anatomy 305, 307, 309) and gain experience in teaching over the range of departmental interests. The anatomy division is also a participating member of several interdisciplinary training programs, such as those in genetics, cell and molecular biology, neurobiology, pharmacology, and biological systems. All students are encouraged to round out their training by drawing upon anatomy courses as well as those offered by other departments in the University. Laboratories within the division are equipped for and actively support research in several areas.

Note: The three general subdivisions of anatomy may be reconstituted during the 1988-89 academic year under three new departments currently under consideration: cell biology; neurobiology; and biological anthropology and anatomy. For further information contact the Director of Graduate Studies.

Courses of Instruction

216S. Biological Psychology
217. Structure and Function of Visual Photoreceptors
219. Molecular and Cellular Bases of Differentiation
220. Developmental Biology
225. Neurobiology of Sensory Systems
246S. The Primate Fossil Record
259. Molecular Biology I: Protein and Membrane Structure/Function
266S. Comparative Neurobiology
269. Advanced Cell Biology
286. Electron Microscopy and Related Techniques
292. Topics in Morphology and Evolution
301. Anatomy of the Limbs
305. Gross Human Anatomy
307. Microscopic Anatomy
309. Neuroanatomy

310. Frontiers in Neurobiology
312. Research
313, 314. Anatomy Seminar
340. Tutorial in Advanced Anatomy
354. Research Techniques in Anatomy
370. Neurobiology I
418. Reproductive Biology
424. Seminar in Reproductive Biology

Courses Currently Unscheduled

219S. Seminar
238. Functional and Evolutionary Morphology of Primates
288S. The Cell in Development and Heredity
302. Advanced Topics and Research Seminar in Smooth and Striated Muscle

Anthropology

Associate Professor Kenneth E. Glander, Ph.D. (Chicago), *Chairman*
Associate Professor Carol A. Smith, Ph.D. (Stanford), *Director of Graduate Studies*

Professors

Matt Cartmill, Ph.D. (Chicago); Richard G. Fox, Ph.D. (Michigan); William O'Barr, Ph.D. (Northwestern); Elwyn L. Simons, Ph.D. (Princeton), D.Phil. (University Coll., Oxford), *James B. Duke Professor of Anthropology*

Associate Professors

Mahadev L. Apte, Ph.D. (Wisconsin); Virginia R. Domínguez, Ph.D. (Yale); William Hylander, Ph.D. (Chicago); Naomi Quinn, Ph.D. (Stanford)

Assistant Professor

Patricia Chappell Wright, Ph.D. (City University of New York)

Professors Emeriti

Ernestine Friedl, Ph.D. (Columbia), *James B. Duke Professor Emeritus of Anthropology*; Weston LaBarre, Ph.D. (Yale), *James B. Duke Professor Emeritus of Anthropology*

Adjunct Associate Professors

Richard F. Kay, Ph.D. (Yale); Carol Stack, Ph.D. (Illinois)

The department offers graduate work leading to the Ph.D. degree in anthropology. Applicants for admission should submit scores on the Graduate Record Examination Aptitude Test. Admission to the program is not contingent on previous anthropological course work or any other specific program of study at the undergraduate level.

The department offers a program of specialization in social/cultural anthropology and a program of specialization in physical anthropology. The emphasis of the social/cultural anthropology program is the application of a theoretical and comparative perspective to research in complex societies. Within this perspective, a wide range of interests is represented in the department. The emphasis of the physical anthropology program is primate evolution; areas of concentration include comparative morphology of human and nonhuman primates and primate social behavior.

Curriculum is tailored to the individual student's background, academic needs, and research goals; pursuit of relevant cross-disciplinary study, within and outside the department, is expected. However, a modest number of courses is required of students in both programs. Candidates for the Ph.D. degree must demonstrate competence in their chosen subfield of specialization and knowledge of the broad theoretical perspectives, from all relevant disciplines, which inform their area of concentration.

Further details of the graduate program in anthropology, the departmental facilities, the staff, and various stipends available are described in the *Guidelines for Graduate Students in Anthropology* which may be obtained from the Director of Graduate Studies.

Note: Physical anthropology may be reconstituted during the 1988-89 academic year in a new department. For further information contact the Director of Graduate Studies.

Courses of Instruction

201S. Marxism and Anthropology
204S. The Anthropology of Cities
206S. Current Theoretical Schools in Anthropology
211S. Ethnography of Communication
215S. The Anthropology of Women: Theoretical Issues
228S. Slavery and Society
234S. Political Economy of Development: Theories of Change in the Third World
239. Culture and Ideology
244S. Primate Behavior
246S. The Primate Fossil Record
251S. American Marriage: A Cultural Approach
255S. Heroes and Heroics: Culture and the Individual

258S. Symbols in Society
267. Cognitive Anthropology
272S. Marxism and Feminism
280S, 281S. Seminar in Selected Topics
282S. Canada
330S, 331S. Theories and Methods in Socio-cultural Anthropology
393. Individual Research in Anthropology

Courses Currently Unscheduled

205. The Anthropology of Anthropology
237S. Interpretations of Kinship
275S. Inequality in Precapitalist Societies
334. Topics in Physical Anthropology

Art and Art History

Professor John R. Spencer, Ph.D. (Yale), *Director of Graduate Studies*

Professor

Rona Goffen, Ph.D. (Columbia)

Associate Professors

Caroline A. Bruzelius, Ph.D. (Yale); Ann W. Epstein, Ph.D. (Courtauld Institute, University of London)

Assistant Professors

David Castriota, Ph.D. (Columbia); Judy Sund, Ph.D. (Columbia)

Professor Emeritus

Sidney David Markman, Ph.D. (Columbia)

Graduate work in the Department of Art and Art History is offered leading to the A.M. degree in art history and is designed to provide basic training in the history of art with specialization in a given field selected by the student after consultation with and approval by the Director of Graduate Studies. Prospective students should present a minimum of 24 semester hours of undergraduate work in the history of art. In special cases a student who does not fulfill this prerequisite may be required to attend prescribed

undergraduate courses. A reading knowledge of one foreign language (preferably German) is required; candidates who do not meet this requirement upon admission to the program are expected to do so by the end of their first term in residence.

The program for the A.M. degree in art history consists of 30 units as follows: 12 units in art history; 6 units in an approved minor; 6 units in the major or minor, or other approved subject; and 6 units in thesis. A written thesis is required.

Courses of Instruction

230S. Medieval and Byzantine Art and Architecture
232S. Romanesque and Gothic Art and Architecture
234. Medieval Architecture
235. Gothic Cathedrals
241. Fifteenth-Century Italian Art
242S. Studies in Italian Renaissance Art
243S. Studies in Northern Art
251. Italian Baroque Art
252. Northern Baroque Painting
261S. Studies in Romanticism
262S. Studies in Nineteenth-Century Art
274. The History of Impressionism
275. Surrealism

276S. Problems in Modern Art
278. Twentieth-Century Criticism
293S. Methods in Art History
294, 295. Special Problems in Art History

Courses Currently Unscheduled

220S. Greek Painting
227. Early Christian Culture: Evidence of Art and Literature
231. Byzantine Art and Architecture
240. Italian Art
245. Sixteenth-Century Italian Art
277S. Contemporary Art
279S. Problems in Modern Architecture

Asian Languages

The courses are offered as an enrichment for students interested in the South Asian subcontinent. See the announcement for the Asian-Pacific Studies Institute in this bulletin in the section on special programs. For courses in Chinese and Japanese, see the *Bulletin of Duke University: Undergraduate Instruction*.

Courses Currently Unscheduled

Hindi-Urdu 200, 201. Special Studies in South Asian Languages
Hindi-Urdu 203. Studies in Commonwealth Literature

Biochemistry

Professor Robert L. Hill, Ph.D. (Kansas), *James B. Duke Professor of Biochemistry and Chairman*
Professor Robert E. Webster, Ph.D. (Duke), *Director of Graduate Studies*

Professors

Robert Bell, Ph.D. (California at Berkeley); Vann Bennett, M.D., Ph.D. (Johns Hopkins); Irwin Fridovich, Ph.D. (Duke), *James B. Duke Professor of Biochemistry*; Samson R. Gross, Ph.D. (Columbia); Walter R. Guild, Ph.D. (Yale); Henry Kamin, Ph.D. (Duke); Nicholas M. Kredich, M.D. (Michigan); Robert J. Lefkowitz, M.D. (Columbia); Kenneth S. McCarty, Ph.D. (Columbia); Paul L. Modrich, Ph.D. (Stanford); K. V. Rajagopalan, Ph.D. (Univ. of Madras); Lewis M. Siegel, Ph.D. (Johns Hopkins); Leonard Spicer, Ph.D. (Yale)

Associate Professors

Ronald C. Greene, Ph.D. (California Inst. of Tech.); Arno L. Greenleaf, Ph.D. (Harvard); Edward Holmes, M.D. (Pennsylvania); Tao-shih Hsieh, Ph.D. (California at Berkeley); Bernard Kaufman, Ph.D. (Indiana); David C. Richardson, Ph.D. (Massachusetts Inst. of Tech.); Harvey J. Sage, Ph.D. (Yale); Deborah A. Steege, Ph.D. (Yale); James B. Sullivan, Ph.D. (Texas)

Assistant Professors

Michael Been, Ph.D. (University of Washington, Seattle); Perry J. Blackshear, M.D. (Harvard); Carol Fierke, Ph.D. (Brandeis); Michael S. Hershfield, M.D. (Pennsylvania); Russel E. Kaufman, M.D. (Ohio State University); David M. Schlossman, Ph.D. (Duke)

Professor Emeritus

Mary L. C. Bernheim, Ph.D. (Univ. of Cambridge)

Associate Medical Research Professor

Jane Richardson, M.A.T. (Harvard)

Graduate work in the Department of Biochemistry is offered leading to the Ph.D. degree. Preparation for such graduate study may take diverse forms. Undergraduate

majors in chemistry, biology, mathematics, or physics are welcome, but adequate preparation in chemistry is essential. Graduate specialization areas include protein structure and function, crystallography of macromolecules, nucleic acid structure and function, lipid biochemistry, membrane structure and function, molecular genetics, enzyme mechanisms, and neurochemistry. The Division of Genetics of the department, in cooperation with the University Program in Genetics, offers biochemistry students the opportunity to pursue advanced research and study to fulfill the requirements for the Ph.D. degree.

Courses of Instruction

200. General Biochemistry
 209, 210. Independent Study
 215. Genetic Mechanisms
 219. Molecular and Cellular Bases of Differentiation
 219S. Seminar
 222. Structure of Biological Macromolecules
 224. Biochemistry of Development and Differentiation
 227. Introductory Biochemistry I: Intermediary Metabolism
 259. Molecular Biology I: Protein and Membrane Structure/Function
 265S, 266S. Seminar

268. Molecular Biology II: Nucleic Acids
 288. The Carbohydrates and Lipids of Biological Systems
 291. Physical Biochemistry
 297. Intermediary Metabolism
 299. Nutrition
 345, 346. Biochemistry Seminar
 347, 348. Seminar in Toxicology

Courses Currently Unscheduled

245L. Macromolecules, Ecology, and Evolution
 276. Comparative and Evolutionary Biochemistry
 286. Current Topics in Immunochemistry

Botany

Professor William L. Culberson, Ph.D. (Wisconsin), *Hugo L. Blomquist Professor of Botany and Chairman*
 Professor John E. Boynton, Ph.D. (California at Davis), *Director of Graduate Studies*

Professors

Janis Antonovics, Ph.D. (Univ. Coll. of North Wales), *James J. Wolfe Professor of Botany*; Norman L. Christensen, Jr., Ph.D. (California at Santa Barbara); C. Barry Osmond, Ph.D. (Univ. of Adelaide), *Arts and Sciences Distinguished Professor of Botany*; Joseph S. Ramus, Ph.D. (California at Berkeley); William H. Schlesinger, Ph.D. (Cornell); Richard B. Searles, Ph.D. (California at Berkeley); James N. Siedow, Ph.D. (Indiana); Donald E. Stone, Ph.D. (California at Berkeley); Boyd R. Strain, Ph.D. (California at Los Angeles); Richard A. White, Ph.D. (Michigan); Robert L. Wilbur, Ph.D. (Michigan)

Associate Professor

Kenneth R. Knoerr, Ph.D. (Yale)

Assistant Professors

Stephen A. Johnston, Ph.D. (Wisconsin); Bruce D. Kohorn, Ph.D. (Yale); Brent D. Mishler, Ph.D. (Harvard); Rytas Vilgalys, Ph.D. (Virginia Polytechnic and State Univ.)

Professors Emeriti

Lewis Edward Anderson, Ph.D. (Pennsylvania); William D. Billings, Ph.D. (Duke), *James B. Duke Professor Emeritus of Botany*; Henry Hellmers, Ph.D. (California at Berkeley); Paul J. Kramer, Ph.D. (Ohio State), *James B. Duke Professor Emeritus of Botany*; Aubrey Willard Naylor, Ph.D. (Chicago), *James B. Duke Professor Emeritus of Botany*; Jane Philpott, Ph.D. (Iowa)

Adjunct Professor

Chicita F. Culberson, Ph.D. (Duke)

Adjunct Associate Professor

David T. Patterson, Ph.D. (Duke)

Graduate work in the Department of Botany is offered leading to the A.M. (nonthesis), M.S. (thesis), and Ph.D. degrees. Students entering the graduate program in Botany normally have a broad background in the botanical or biological sciences supplemented with basic courses in chemistry, mathematics, and physics. Biochemistry and physical chemistry are strongly recommended for students interested in molecular areas, and advanced courses in mathematics are recommended for students in population genetics and ecology. Deficiencies may be corrected by taking appropriate courses during the first year of graduate study.

Students in Botany may specialize in a wide variety of areas including anatomy; cellular and molecular biology; evolution; developmental, ecological, molecular, organelle, and population genetics; physiology; community, ecosystem, physiological, and population ecology; marine biology; and the systematics of algae, fungi, lichens, bryophytes, ferns, and flowering plants. Students' programs are tailored to individual needs. A brochure providing detailed information on the Botany Department is available from the Director of Graduate Studies.

Courses of Instruction

205. Molecular Biology
 210L. Bryology
 212L. Phycology
 216. Biology of Marine Macrophytes
 218. Barrier Island Ecology
 221L. Mycology
 222S. Topics in Advanced Mycology
 225T, 226T. Special Problems
 227. Introductory Biochemistry I: Intermediary Metabolism
 232. Microclimatology
 234S. Problems in the Philosophy of Biology
 237L. Systematic Biology
 242L. Systematics
 243. Classification of Angiosperms
 245L. Plant Diversity
 246L. Ecology of Plants
 250L,S. Plant Biosystematics
 251L. Plant Physiology
 253. Biophysical Plant Physiology
 261. Photosynthesis
 263L. Tropical Seaweeds
 265L. Physiological Plant Ecology
 266. Plant Population Biology

267L. Community Ecology
 268. Molecular Biology II: Nucleic Acids
 269. Advanced Cell Biology
 272. Biogeochemistry
 280. Principles of Genetics
 283. Extrachromosomal Inheritance
 285S. Ecological Genetics
 286. Evolutionary Mechanisms
 287S. Macroevolution
 293L. Population Biology
 295S, 296S. Seminar
 300. Tropical Biology: An Ecological Approach
 330L. Environmental Monitoring and Instrumentation
 359, 360. Research in Botany

Courses Currently Unscheduled

209L. Lichenology
 219L. Benthic Marine Algae
 243S. Classification of Angiosperms
 247L. Plant Ecology
 260L. Plant Anatomy
 344. Micrometeorology and Biometeorology Seminar

Related Programs

The University Program in Cell and Molecular Biology. Cell and Molecular Biology courses offered by the Botany Department are an integral part of this interdepartmental program. Refer to the announcement in this bulletin under The University Program in Cell and Molecular Biology.

University Program in Genetics. Genetics courses offered by the botany department are an integral part of this interdepartmental program. Refer to the announcement in this bulletin under The University Program in Genetics.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Central America. Refer to Organization for Tropical Studies in the section on special programs.

The University Program in Marine Sciences. Interdisciplinary programs emphasizing marine botany are available. Refer to the announcement in this bulletin under The University Program in Marine Sciences.

Business Administration

Professor Thomas F. Keller, Ph.D. (Michigan), *R. J. Reynolds Industries Professor of Business Administration and Dean*
 Professor James R. Bettman, Ph.D. (Yale), *Burlington Industries Professor of Business Administration and Director of Graduate Studies*

Professors

Robert Ashton, Ph.D. (Minnesota); Helmy Baligh, Ph.D. (California at Berkeley); Richard M. Burton, D.B.A. (Illinois); Kalman J. Cohen, Ph.D. (Carnegie-Mellon); John D. Forsyth, D.B.A. (Illinois); Dan J. Laughunn,

D.B.A. (Illinois); Arie Y. Lewin, Ph.D. (Carnegie-Mellon); Wesley A. Magat, Ph.D. (Northwestern); Thomas H. Naylor, Ph.D. (Tulane); John W. Payne, Ph.D. (California at Irvine); Rakesh K. Sarin, Ph.D. (California at Los Angeles); Richard Staelin, Ph.D. (Michigan), *Edward and Rose Donnell Professor of Business Administration*; Robert L. Winkler, Ph.D. (Chicago)

Associate Professors

Allison Ashton, Ph.D. (Texas); Joseph Battle, Ph.D. (Michigan); Douglas T. Breeden, Ph.D. (Stanford); Marian Burke, Ph.D. (California at Los Angeles); Julie A. Edell, Ph.D. (Carnegie-Mellon); Grant W. Gardner, Ph.D. (Harvard); Joel C. Huber, Ph.D. (Pennsylvania); John M. McCann, Ph.D. (Purdue); Joseph B. Mazzola, Ph.D. (Carnegie-Mellon); William E. Ricks, Ph.D. (California at Berkeley); Blair H. Sheppard, Ph.D. (Illinois at Champaign); Anne S. Tsui, Ph.D. (California at Los Angeles); Robert E. Whaley, Ph.D. (Toronto)

Assistant Professors

William F. Boulding, Ph.D. (Pennsylvania); Jane L. Butt, Ph.D. (Michigan); Richard L. Daniels, Ph.D. (California at Los Angeles); F. Douglas Foster, Ph.D. (Cornell); Jennifer Francis, Ph.D. (Cornell); Christopher Gresov, Ph.D. (Columbia); Campbell R. Harvey, Ph.D. (University of Chicago); Michael L. Hemler, Ph.D. (University of Chicago); Naoki Kishimoto, Ph.D. (New York University); Frederick Lindahl, Ph.D. (University of Chicago); Kevin F. McCardle, Ph.D. (California at Los Angeles); Michael J. Moore, Ph.D. (Michigan); Robert F. Nau, Ph.D. (California at Berkeley); Donna Rae Philbrick, Ph.D. (Cornell); Elaine Romanelli, Ph.D. (Columbia); Jeffrey L. Rummel, Ph.D. (Rochester); Jens A. Stephan, Ph.D. (Cornell); S. Viswanathan, Ph.D. (Northwestern)

Adjunct Professor

David West Peterson, Ph.D. (Stanford)

The Ph.D. in Business Administration program prepares candidates for research and teaching careers at leading educational institutions and for careers in business and governmental organizations where advanced research and analytical capabilities are required. The Ph.D. program places major emphasis on independent inquiry, on the development of competence in research methodology, and on the communication of research results.

The program requires that doctoral candidates must acquire expertise in their chosen area of study and in research methodology. This competence may be gained from course work, participation in seminars, and independent study. The student and his/her faculty committee determine the specific program of study, subject to the approval of the Director of the Doctoral Program. Each student takes a comprehensive examination at the end of the second year or at the beginning of the third year of residence. The final requirement is the presentation of a dissertation. The Ph.D. program usually requires four years of work beyond the bachelor's degree.

Refer to the *Bulletin of Duke University: The Fuqua School of Business* for a complete list of courses and course descriptions.

Courses of Instruction

- 510. Bayesian Inference and Decision
- 521. Organization Seminar: A Micro Focus
- 522. Organization Seminar: A Macro Focus
- 525. Behavioral Decision Theory
- 531. Financial Accounting Seminar
- 532. Management Accounting Seminar
- 551. Corporate Finance Seminar
- 552. Investment Seminar
- 561. Seminar in Quantitative Research in Marketing
- 562. Seminar in Behavioral Models in Marketing
- 571. Operations Strategy Seminar
- 572. Seminar in Operational and Technological Tactics
- 597. Dissertation Research
- 598. Independent Study
- 599. Directed Research

Courses Currently Unscheduled

- 309.1-9. Research in Managerial Economics
- 319.1-9. Research in Quantitative Methods
- 329.1-9. Research in Organization Theory and Management
- 339.1-9. Research in Information and Accounting Systems
- 349.1-9. Research in Public Policy and Social Responsibility
- 359.1-9. Research in Finance
- 369.1-9. Research in Marketing
- 379.1-9. Research in Production
- 392-393. Tutorial in Interdisciplinary Areas
- 397. Dissertation Research

The University Program in Cell and Molecular Biology

Professor Robert L. Hill, Ph.D. (Kansas), *James B. Duke Professor of Biochemistry and Director*
Associate Professor Bernard Kaufman, Ph.D. (Indiana), *Associate Director*

Professors

Harold Erickson, Ph.D. (Johns Hopkins); David R. McClay, Ph.D. (North Carolina at Chapel Hill); Paul L. Modrich, Ph.D. (Stanford); R. Bruce Nicklas, Ph.D. (Columbia); Salvatore V. Pizzo, M.D., Ph.D. (Duke); Thomas C. Vanaman, Ph.D. (Duke)

Associate Professors

Jack D. Keene, Ph.D. (Washington); James N. Siedow, Ph.D. (Indiana)

Assistant Professor

Marc G. Caron, Ph.D. (University of Miami)

Faculty: A complete list of faculty, including research interests, will be made available to prospective students.

Research training in cell, developmental, and molecular biology is found in eight departments at Duke University: anatomy, biochemistry, botany, microbiology and immunology, pathology, pharmacology, physiology, and zoology. To effectively utilize this broad spectrum of expertise for the training of promising young scientists while still providing a coherent curriculum, the Duke University Program in Cell and Molecular Biology has been established.

During the first year of doctoral study a student will complete the program's three-course sequence presenting current understanding and research activities in cell biology and the molecular biology of nucleic acids, proteins, and membranes. Each student will also affiliate with a department, fulfill departmental requirements, and choose elective courses in an area of specialization. Research training is stressed throughout the program and dissertation research usually begins by the third semester. Normally the dissertation adviser will be chosen from within the student's own department but, depending on the student's research interests, dissertation research with an adviser in another department may be approved.

Prospective students may apply directly to the Cell and Molecular Biology Program or to one of the eight participating departments. Those who apply to the program must also designate a departmental preference. Applicants must have demonstrated, in addition to overall academic excellence, a proficiency in the biological and physical sciences. Applications for admission and fellowship support must be received by February 1, but early applications may receive earlier consideration.

Courses of Instruction

259. Molecular Biology I: Protein and Membrane Structure/Function

264. Cell and Molecular Biology Seminar

268. Molecular Biology II: Nucleic Acids

269. Advanced Cell Biology

Cell Biology

Professor Harold P. Erickson, Ph.D. (Johns Hopkins), *Acting Chairman*

For further information about the graduate program please contact the department directly.

Chemistry

Professor Edward M. Arnett, Ph.D. (Pennsylvania), *R.J. Reynolds Industries Professor of Chemistry and Chairman*
Professor Steven Baldwin, Ph.D. (California Inst. of Tech.), *Director of Graduate Studies*

Professors

Donald B. Chesnut, Ph.D. (California Inst. of Tech.); Alvin L. Crumbliss, Ph.D. (Northwestern); Bertram O. Fraser-Reid, Ph.D. (Alberta), *James B. Duke Professor of Chemistry*; Peter W. Jeffs, Ph.D. (Univ. of Natal); William R. Krigbaum, Ph.D. (Illinois), *James B. Duke Professor of Chemistry*; Charles H. Lochmüller, Ph.D. (Fordham); Andrew T. McPhail, Ph.D. (Univ. of Glasgow); Richard A. Palmer, Ph.D. (Illinois); Ned Allen Porter, Ph.D. (Harvard), *James B. Duke Professor of Chemistry*; Peter Smith, Ph.D. (Univ. of Cambridge); Howard Austin Strobel, Ph.D. (Brown); Richard L. Wells, Ph.D. (Indiana); Pelham Wilder, Jr., Ph.D. (Harvard)

Associate Professors

Robert W. Henkens, Ph.D. (Yale); Linda B. McGown, Ph.D. (Univ. of Washington); Barbara Ramsay Shaw, Ph.D. (Univ. of Washington)

Assistant Professors

Richard A. MacPhail, Ph.D. (California at Berkeley); Richard P. Polniaszek, Ph.D. (UCLA); Weitao Yang, Ph.D. (North Carolina at Chapel Hill)

Professors Emeriti

Charles Kilgo Bradsher, Ph.D. (Harvard); Frances C. Brown, Ph.D. (Johns Hopkins); Marcus E. Hobbs, Ph.D. (Duke); Jacques C. Poirier, Ph.D. (Chicago); Louis DuBose Quin, Ph.D. (North Carolina at Chapel Hill), *James B. Duke Professor Emeritus of Chemistry*

Adjunct Professors

Robert G. Ghirardelli, Ph.D. (California Inst. of Tech.); Eugene Magat, Ph.D. (Mass. Inst. of Technology); Colin G. Pitt, Ph.D. (Univ. of London); Bernard Spielvogel, Ph.D. (Michigan)

Adjunct Associate Professors

David Millington, Ph.D. (University of Liverpool); George Painter, Ph.D. (Emory University)

Adjunct Assistant Professor

Mary Ellen Switzer, Ph.D. (Illinois)

In the Department of Chemistry graduate work is offered leading to the M.S. and Ph.D. degrees. Before undertaking a graduate program in chemistry, a student should have taken an undergraduate major in chemistry, along with related work in mathematics and physics.

Graduate courses in the department are offered in the fields of analytical, inorganic, organic, and physical chemistry. Research programs are active in all these fields.

A booklet providing detailed information on the department is available from the Director of Graduate Studies.

Courses of Instruction

- | | |
|--|--|
| 201. Molecular Spectroscopy | 320. Synthetic Organic Chemistry |
| 203. Quantum Chemistry | 322. Organic Reactive Intermediates |
| 205. Structure and Reaction Dynamics | 324. Special Topics in Organic Chemistry |
| 207. Principles of Kinetics, Thermodynamics, and Diffraction | 330. Separation Science and Fundamental Electrochemistry |
| 275, 276. Advanced Studies | 331, 332. Special Topics in Analytical Chemistry |
| 300. Basic Statistical Mechanics | 334. Chemical Instrumentation and Practical Electrochemistry |
| 302. Basic Quantum Mechanics | 373, 374. Seminar |
| 303, 304. Special Topics in Physical Chemistry | 375, 376. Research |
| 310. Theoretical and Structural Inorganic Chemistry | 377. Research Orientation Seminar |
| 312. Inorganic Reactions and Mechanisms | |
| 313. Special Topics in Inorganic Chemistry | |

Classical Studies

Professor Francis Newton, Ph.D. (North Carolina at Chapel Hill), *Chairman*

Associate Professor Kent J. Rigsby, Society of Fellows (Harvard), *Director of Graduate Studies*

Professors

John F. Oates, Ph.D. (Yale); Lawrence Richardson, Jr., Ph.D. (Yale)

Associate Professors

Mary T. Boatwright, Ph.D. (Michigan); Peter Burian, Ph.D. (Princeton); Dennis Keith Stanley, Jr., Ph.D. (Johns Hopkins); John G. Younger, Ph.D. (Cincinnati)

Assistant Professor

Paul Vander Waert, Ph.D. (Princeton)

Professor Emeritus

William H. Willis, Ph.D. (Yale)

The Department of Classical Studies offers graduate work leading to the A.M. and Ph.D. degrees in classical studies. Work in the department encompasses all aspects of the Greco-Roman world: students in the program are able, through course work, directed research, and their own teaching, to prepare for careers of teaching and research as broadly trained classical scholars. For regular admission, students should offer at least three

years of college study in one of the classical languages and two in the other. Before developing a specialization within the program, students are expected to acquire facility in both Greek and Latin, a broad knowledge of the literatures and of ancient history and archaeology, and command of research methods. Reading knowledge of French and German is required for the Ph.D. The resources of the department include important collections of Greek and Latin manuscripts and papyri, computer facilities in the ancient languages, and a valuable study collection of Greek and Roman art. The department publishes the journal *Greek, Roman, and Byzantine Studies*. The Director of Graduate Studies will provide on request a brochure giving further information about the department's requirements, resources, and financial aid; prospective students should also consult the general requirements of the University set forth in the section on "General Regulations Governing Graduate Studies" in this bulletin.

Greek

Courses of Instruction

- 200. Intensive Survey of Greek Literature I
- 201. Intensive Survey of Greek Literature II
- 203. Homer
- 222. The Historians
- 301. Seminar in Greek Literature I
- 302. Seminar in Greek Literature II
- 399. Directed Reading and Research

Courses Currently Unscheduled

- 205. Greek Lyric Poets
- 207. The Dramatists
- 221. Early Greek Prose
- 226. The Orators
- 313. Proseminar in Greek Epigraphy
- 321. Seminar in Literary Papyri

Latin

Courses of Instruction

- 200. Intensive Survey of Latin Literature I
- 201. Intensive Survey of Latin Literature II
- 205. The Roman Novel
- 206. Cicero
- 214. The Historians
- 301. Seminar in Latin Literature I
- 302. Seminar in Latin Literature II
- 399. Directed Reading and Research

Courses Currently Unscheduled

- 204. Epic of the Silver Age: Lucan to Statius
- 207. Vergil's *Aeneid*
- 208. Lyric and Occasional Poetry
- 211. Elegiac Poets
- 221. Medieval Latin
- 312. Proseminar in Latin Paleography
- 314. Proseminar in Latin Epigraphy
- 315. Proseminar in Roman Law

Classical Studies (Ancient History)

Courses of Instruction

- 221. Archaic Greece
- 226. Late Antiquity
- 258. Social and Cultural History of the Graeco-Roman World
- 321. Seminar in Ancient History I
- 322. Seminar in Ancient History II
- 399. Directed Reading and Research

Courses Currently Unscheduled

- 222. Fifth and Fourth Century Greece
- 223. Alexander and the Hellenistic World
- 224. The Roman Republic
- 225. The Roman Empire
- 327. Seminar in Byzantine History

Classical Studies (Archaeology)

Courses of Instruction

- 231S. Greek Sculpture
- 232S. Greek Painting
- 311. Archaeology Seminar I
- 312. Archaeology Seminar II
- 399. Directed Reading and Research

Courses Currently Unscheduled

- 233S. Greek Architecture
- 234S. Roman Sculpture
- 235S. Roman Architecture
- 236S. Roman Painting

Under the terms of a cooperative agreement, graduate students of Duke University may take appropriate graduate courses offered by the Departments of Classics or Art of the University of North Carolina. A list of these courses will be sent upon request.

Computer Science

Professor Donald Rose, Ph.D. (Harvard), *Chairman*

Assistant Professor Gershon Kedem, Ph.D. (Wisconsin), *Director of Graduate Studies*

Professors

Alan W. Biermann, Ph.D. (California at Berkeley); Thomas M. Gallie, Ph.D. (Rice); Donald W. Loveland, Ph.D. (New York Univ.); Peter N. Marinos, Ph.D. (North Carolina State); Merrell L. Patrick, Ph.D. (Carnegie-Mellon); John H. Reif, Ph.D. (Harvard); Charles Starmer, Ph.D. (North Carolina at Chapel Hill); Kishor S. Trivedi, Ph.D. (Illinois); Senol Utku, Sc.D. (Massachusetts Inst. of Tech.); Max A. Woodbury, Ph.D. (Michigan)

Associate Professors

Carla S. Ellis, Ph.D. (Washington); Henry S. Greenside, Ph.D. (Princeton); Robert A. Wagner, Ph.D. (Carnegie-Mellon)

Assistant Professors

John A. Board, Jr., Ph.D. (Oxford); Joanne Bechta Dugan, Ph.D. (Duke); Carl L. Gardner, Ph.D. (M.I.T.); Mark A. Holliday, Ph.D. (Wisconsin); Gopalan Nadathur, Ph.D. (Pennsylvania); Daniel Szyld, Ph.D. (New York Univ.)

Research Associate Professors

John L. Ellis, Ph.D. (Toledo); Mailen Kootsey, Ph.D. (Brown); Dietolf Ramm, Ph.D. (Duke)

Research Assistant Professor

Jonathan B. Rosenberg, Ph.D. (Duke)

Adjunct Professor

Robert G. Voight, Ph.D. (Maryland)

Adjunct Associate Professor

William Marvin Coughran, Jr., Ph.D. (Stanford)

Adjunct Assistant Professor

John McHugh, Ph.D. (Texas at Austin)

The Department of Computer Science offers programs leading to the M.S. and Ph.D. degrees. The department also actively cooperates with the computer science department of the University of North Carolina at Chapel Hill.

A student entering graduate work in computer science should have had three semesters of calculus and one semester of linear algebra, and have a knowledge of data structures, and of assembler as well as higher-level computer programming languages. Research interests of present faculty include mathematical foundations of methodology, real-time computing, operating data base systems, computer systems design and analysis, parallel processing systems, scientific computation (including numerical analysis), and very large-scale integration.

Courses of Instruction

- 200. Programming Methodology I
- 201. Programming Languages
- 202. Applied Discrete Structures
- 204. Computer Network Architecture
- 207. Fault-Tolerant Computer Systems
- 208. Digital Computer Design
- 209. Microprocessor Fundamentals and Applications
- 210. VLSI Systems: an Introduction
- 212. Introduction to Scientific Computing
- 215. Artificial Intelligence
- 221. Numerical Analysis I
- 222. Numerical Differential Equations
- 223. Numerical Linear Algebra
- 224. Analysis of Algorithms
- 225. Formal Languages and Theory of Computation
- 226. Mathematical Methods for Systems Analysis I
- 227. Mathematical Methods for Systems Analysis II
- 231. Introduction to Operating Systems
- 232. Compiler Construction
- 241. Data Base Methodology
- 252. Computer Systems Organization
- 265. Advanced Topics in Computer Science
- 276. Communication, Computation, and Memory in Biological Systems

- 308. Advanced Topics in Digital Systems
- 310. CMOS VLSI Design
- 315. Advanced Topics in Artificial Intelligence
- 316. Computational Linguistics
- 320. VLSI Algorithmics
- 321. Topics in Numerical Mathematics
- 326. Systems Modeling
- 331. Operating Systems Theory
- 382. Seminar in Artificial Intelligence

Courses Currently Unscheduled

- 301. Topics in Programming Theory
- 325. Theory of Computation
- 332. Topics in Operating Systems

Supplementary Courses Offered at UNC-CH

- Comp 145. Software Engineering Laboratory
- Comp 171. Natural Language Processing
- Comp 230. File Management Systems
- Comp 236. Computer Graphics
- Comp 238. Raster Graphics
- Comp 254. Picture Processing and Pattern Recognition
- Comp 265. Architecture of Computers

Economics

Professor John M. Vernon, Ph.D. (Massachusetts Institute of Technology), *Chairman*
Professor T. Dudley Wallace, Ph.D. (Chicago), *Director of Graduate Studies*

Professors

Charles T. Clotfelter, Ph.D. (Harvard); Phillip J. Cook, Ph.D. (California at Berkeley); David G. Davies, Ph.D. (California at Los Angeles); Neil Barry de Marchi, Ph.D. (Australian National Univ.); John F. Geweke, Ph.D. (Minnesota), *William Rand Kenan, Jr. Professor of Economics*; Dean S. Malcolm Gillis, Ph.D. (Illinois); Craufurd D. Goodwin, Ph.D. (Duke), *James B. Duke Professor of Economics*; Henry G. Grabowski, Ph.D. (Princeton); Daniel A. Graham, Ph.D. (Duke); Thomas M. Harvrilesky, Ph.D. (Illinois); Allen C. Kelley, Ph.D. (Stanford), *James B. Duke Professor of Economics*; Anne O. Krueger, Ph.D. (Wisconsin), *Distinguished Professor of Economics*; Majorie McElroy, Ph.D. (Northwestern); Thomas H. Naylor, Ph.D. (Tulane); George E. Tauchen, Ph.D. (Minnesota); Edward Tower, Ph.D. (Harvard); Vladimir G. Trembl, Ph.D. (North Carolina at Chapel Hill); E. Roy Weintraub, Ph.D. (Pennsylvania); William P. Yohe, Ph.D. (Michigan)

Associate Professors

Kent P. Kimbrough, Ph.D. (Chicago); Robert C. Marshall, Ph.D. (California at San Diego)

Assistant Professors

James Baumgardner, Ph.D. (Chicago); Phillip L. Brock, Ph.D. (Stanford); Robert C. Marshall, Ph.D. (California at San Diego); Michael Meurer, Ph.D. (Minnesota); Carola Pessino, Ph.D. (Chicago); Dale O. Stahl II, Ph.D. (California at Berkeley); Gary A. Zarkin, Ph.D. (Chicago)

Research Professors

A. W. Coats, Ph.D. (Johns Hopkins); James Henderson, Ph.D. (Harvard)

Adjunct Professor

Robert H. Bates, Ph.D. (MIT); A. Ronald Gallant, Ph.D. (Iowa State University); Helen F. Ladd, Ph.D. (Harvard); Jean-Francois Richard, Ph.D. (Catholic University of Louvain)

The Department of Economics offers graduate work leading to the A.M. and Ph.D. degrees. Among the undergraduate courses of distinct advantage to the graduate student in economics are statistics, economy theory, and basic courses in philosophy, mathematics, and social sciences other than economics. Advanced work in mathematics or statistics is also useful.

Requirements for the Ph.D. degree in economics include courses in economic theory, quantitative methods, and econometrics in the first year, and at the end of the second year, an examination in economic analysis. In addition, a student must obtain certification in three fields, one of which may be in an outside minor. The student may select from advanced economic theory, history of political economy, economic development, economic history, international economics, money and banking, labor economics, public finance, industrial organization, econometrics, statistics, Soviet economics, corporate economics, and certain fields outside the economics department (e.g., demography). Course work for the Ph.D. degree should be completed in five semesters of residence.

Courses of Instruction

200. Capitalism and Socialism
201S, 202S. Current Issues in Economics
204S. Advanced Monetary Economics
205S. Advanced Monetary Theory and Policy
207S. Conflict and Cooperation in Economics
208S. Labor Supply and the Family
212S. Economic Science and Economic Policy
213S.1. The Economics of Slavery in the American South
214. Social Choice
218. Macroeconomic Policy
219S. Economic Problems of Underdeveloped Areas
232. Analytical Methods IV: Topics in Economic Policy
233. Federal, State, and Local Finance and Economic Policies
234. Urban and Regional Economics
243. Econometrics I
244. Corporate Economics I

245. Econometrics II
246. Selected Topics in Econometric Theory
247S. Applied Econometrics
249. Microeconomics
250S. Modern Economic Thought
254. Macroeconomics
265S. International Trade and Finance
268. Federal Tax Policy
286S. Economic Policy Making in Developing Countries
293. Soviet Economic History
294S. Soviet Economic System
301. Microeconomic Analysis I
302. Microeconomic Analysis II
304, 305. Monetary Theory and Policy
307. Quantitative Analysis I
308. Quantitative Analysis II
311, 312. History of Political Economy
313, 314. Seminar in Economic Theory

- 317. Seminar in Demographic, Population, and Resource Problems (Development Economics I)
- 319. Seminar in the Theory and the Problems of Economic Growth and Change (Development Economics II)
- 320. Macroeconomic Analysis I
- 322. Macroeconomic Analysis II
- 324, 325. Economics of the Law
- 326. Stochastic Macroeconomics
- 329. Federal Finance
- 330. Seminar in Public Finance
- 350. Modern Economic Thought
- 355. Seminar in Labor Economics
- 358. Seminar in Labor Market and Related Analysis
- 359. Economic Analysis of Legal Issues
- 365. Seminar in International Trade Theory and Policy
- 366. Seminar in International Monetary Theory
- 380. Graduate Economics Workshops

- 388. Industrial Organization
- 389. Seminar in Industrial and Governmental Problems
- 397, 398. Directed Research

Courses Currently Unscheduled

- 235. The Economics of Crime, Law Enforcement, and Justice
- 285. Evaluation of Public Expenditures
- 303. Theory of Economic Decision Making
- 316. Seminar in Economics of Soviet-Type Socialism
- 321. Theory of Quantitative Economic Policy
- 323. Income Distribution Theory
- 331. Seminar in Economic History
- 345, 346. Demographic Techniques I and II
- 401. Seminar on the British Commonwealth
- 402. Interdisciplinary Seminar in the History of the Social Sciences

Related Courses in Other Departments

Courses in related fields may be selected from anthropology, computer science, forestry, history, mathematics, philosophy, political science, public policy studies, and sociology, or from an area that complements the candidate's area of research interests in economics. See also the section on the Center for Demographic Studies under "Special Programs" in this bulletin.

Education

Associate Professor Lucy T. Davis, Ed.D. (Columbia), *Chairman and Director of Graduate Studies*

Professor

Ellis B. Page, Ed.D. (California at Los Angeles)

Associate Professors

Robert H. Ballantyne, Ed.D. (Washington State); Peter F. Carbone, Ed.D. (Harvard); Joseph Di Bona, Ph.D. (California at Berkeley); Charles B. Johnson, Ed.D. (Duke); Robert N. Sawyer, Ed.D. (Wyoming)

Professor Emeritus

W. Scott Gehman, Jr., Ph.D. (Pennsylvania State)

Adjunct Associate Professor

Robert A. Pittillo, Jr., Ed.D. (Duke)

Lecturer

John A. Fowler, M.D. (Bowman Gray)

Qualified juniors, seniors, and graduate students may enroll in appropriate education courses as electives. Further information may be obtained from the Director of Graduate Studies.

Courses of Instruction

- 205. Selected Topics
- 206. Selected Topics
- 211. Education and the Mass Media
- 212S. Pedagogy and Political Economy: a World View
- 215. Seminar in Teaching
- 215S. Secondary Education: Principles
- 216. Secondary Education: Internship
- 225. The Teaching of History and the Social Studies
- 232. Psychoeducational Counseling with Parents
- 236. Teaching Developmental and Remedial Reading in the Secondary School

- 242. Group Interactions
- 246. Teaching of Mathematics
- 276. Teaching of High School Science
- 350, 351. Directed Activities in Education
- 357. Directed Research

Courses Currently Unscheduled

- 227. Contemporary Theories of Counseling and Psychotherapy
- 248. Practicum in Counseling

Engineering

Professor Earl H. Dowell, Sc.D. (Massachusetts Inst. of Tech.), *Dean*

The School of Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees with a major in biochemical, biomedical, civil and environmental, electrical, and mechanical engineering and materials science. These programs are designed to provide: (1) development of depth and breadth in mathematics, computer science, the basic physical sciences, the life sciences where appropriate, and the engineering sciences; (2) mastery of an advanced body of knowledge in the candidate's chosen field of specialization or research; (3) experience in the art of engineering, including strong elements of intuition, imagination, and judgement; and (4) performance of original research which, in the case of the M.S. degree, demonstrates the ability to advance knowledge in the area of professional study and, in the case of the Ph.D. degree, makes a significant contribution to the research literature through publication in a leading professional journal in the field. Engineering graduate students are expected to participate in advanced seminars appropriate to their fields of study.

A minimum of 30 units of earned graduate credit beyond the bachelor's degree is required for the M.S. degree: 12 in the major, 6 in related minor work (usually mathematics or natural science), 6 in either the major or minor subject or in other areas approved by the major department, and 6 for a research-based thesis. A nonthesis option requiring 30 units of course credit is available. Each degree program imposes additional requirements in the exercise of this option. There is no language requirement for this degree.

A minimum of 60 units of earned graduate credit beyond the bachelor's degree is required for the Ph.D. degree. In civil and environmental engineering, 12 units of course work beyond the master's degree are required to be in the major field, 6 in a related minor field, and 6 in either the major or minor field; in electrical engineering, 24 units are required in the major field and 12 units in a related minor field (often mathematics or natural science), 12 in either the major or minor subject or other areas approved by the major department, and 12 for a research-based dissertation. In biochemical, biomedical, and mechanical engineering and materials science there are no specific course requirements; each program is planned to meet individual needs. Doctoral students are required to pass qualifying and preliminary examinations that consist of either written, oral, or a combination of written and oral components, at the discretion of the committee and the department.

In addition, the School of Engineering and the Fuqua School of Business offer an MBA/MS Joint-Degree program. Further details about this program may be obtained from: Professor Eric I Pas, Director, MBA/MS Joint-Degree Program, Department of Civil and Environmental Engineering.

Courses of Instruction

221. Computational Linear Algebra

222. Computer Solutions of Ordinary and Partial
Differential Equations

Biomedical Engineering

Professor James H. McElhaney, Ph.D. (West Virginia), *Chairman*

Professor Olaf T. von Ramm, Ph.D. (Duke), *Director of Graduate Studies*

Professors

Roger C. Barr, Ph.D. (Duke); Howard G. Clark, Ph.D. (Maryland); William E. Hammond, Ph.D. (Duke); Robert M. Hochmuth, Ph.D. (Brown); Loren W. Nolte, Ph.D. (Michigan); Theo C. Pilkington, Ph.D. (Duke); Robert Plonsey, Ph.D. (California at Berkeley); Myron L. Wolbarsht, Ph.D. (Johns Hopkins)

Associate Professors

Donald S. Burdick, Ph.D. (Princeton); Ronald J. Jaszczak, Ph.D. (University of Florida); Stephen J. Riederer, Ph.D. (Wisconsin)

Assistant Professors

Frederick H. Daniels, Ph.D. (Columbia); William N. Reichert, Ph.D. (Michigan); Peter K. Smith, M.D. (Duke); Gregg E. Trahey, Ph.D. (Duke); George A. Truskey, Ph.D. (MIT)

Research Professor

Frederick L. Thurstone, Ph.D. (North Carolina State)

Research Assistant Professor

Jack T. Cusma, Ph.D. (Wisconsin)

Biomedical engineering is the discipline in which the physical, mathematical, and engineering sciences and associated technology are applied to biology and medicine. Contributions range from modeling and simulation of physiological systems through experimental research to solutions of practical clinical problems. The goal of the graduate program in biomedical engineering is to combine training in advanced engineering, biomedical engineering, and the life sciences so that graduates of the program can contribute at the most advanced professional level. The doctoral dissertation should demonstrate significant and original contributions to an interdisciplinary topic, accomplished as an independent investigator. The major, current, research areas are: biochemical engineering, biomechanics, biomedical materials, biomedical modeling, biosensors, data acquisition and processing, medical imaging, and electrophysiology. Every biomedical engineering graduate student is required to serve as a teaching assistant as part of the graduate training.

Courses of Instruction

201. Electrophysiology
205, 206. Microprocessors and Digital Instruments
207. Transport Phenomena
211. Theoretical Electrophysiology
212. Theoretical Electrocardiography
215. Biomedical Materials and Artificial Organs
222. Principles of Ultrasound Imaging
230. Biomechanics
233. Modern Diagnostic Imaging Systems
235. Acoustics and Hearing

243. Computers in Biomedical Engineering
265. Advanced Topics in Biomedical Engineering
333. Biomedical Imaging
399. Special Readings in Biomedical Engineering

Courses Currently Unscheduled

204. Measurement and Control of Cardiac Electrical Events
221. Electrophysiological Techniques
311. Inverse Models

Civil and Environmental Engineering

Professor P. Aarne Vesilind, Ph.D. (North Carolina at Chapel Hill), *Chairman*

Professor Senol Utku, Sc.D. (Massachusetts Inst. of Technology), *Director of Graduate Studies*

Professors

Robert J. Melosh, Ph.D. (Washington); Henry J. Petroski, Ph.D. (University of Illinois—Urbana); James F. Wilson, Ph.D. (Ohio State)

Associate Professors

Mrinmay Biswas, Ph.D. (Virginia); James D. Bryers, Ph.D. (Rice); Tomasz A. Hueckel, Ph.D. (Polish Academy of Science), D.Sc. (National Polytechnic Inst.); Miguel A. Medina, Jr., Ph.D. (Florida); Eric I. Pas, Ph.D. (Northwestern); J. Jeffrey Peirce, Ph.D. (Wisconsin); Kenneth H. Reckhow, Ph.D. (Harvard)

Assistant Professor

Bruce C. Faust, Ph.D. (Calif. Inst. of Tech.)

A student may specialize in one of the following fields of study for either the M.S. or the Ph.D. degree: environmental engineering; geotechnical engineering and soil mechanics; mechanics of solids; materials engineering; fluid mechanics and water resources; structural engineering; and urban systems and transportation. Interdisciplinary programs combining study in some of the major areas with biological, chemical, and physical sciences; business administration; materials science; social sciences; political science; public policy studies; and other areas of engineering are also available.

With the approval of the department, a master's degree candidate in civil engineering may choose, in lieu of submitting a thesis, to complete an additional 6 units of course work plus a special project. If this alternative is elected, candidates are expected to take comprehensive examinations over their graduate course work, and also to defend orally their special projects.

Under the Reciprocal Agreement with Neighboring Universities, a student may include as a portion of the minimum requirements work offered by the Department of Environmental Sciences and Engineering of the University of North Carolina. Although related work normally is taken in the natural sciences or mathematics, a student whose major interest relates to the social or managerial sciences may take relevant work in these areas.

Courses of Instruction

- 201. Advanced Mechanics of Solids
- 203. Plasticity
- 204. Plates and Shells
- 205. Elasticity
- 207. Transport Phenomena in Biological Systems
- 210. Intermediate Dynamics
- 212. Mechanical Behavior and Fracture of Materials
- 215. Engineering Systems Analysis
- 216. Transportation Planning and Policy Analysis
- 217. Transportation Systems Analysis
- 218. Engineering Management and Project Evaluation
- 225. Dynamic Engineering Hydrology
- 227. Groundwater Hydrology and Contaminant Transport
- 233. Prestressed Concrete Design
- 235. Foundation Engineering
- 236. Earth Structures
- 237. Advanced Soil Mechanics
- 242. Environmental Chemistry
- 243. Physicochemical Unit Operations in Water Treatment
- 244. Applied Microbial Processes
- 245. Pollutant Transport Systems
- 246. Water Supply Design
- 248. Solid Waste and Resource Recovery Engineering
- 249. Control of Hazardous and Toxic Waste

- 251. Systematic Engineering Analysis
- 254. Applications of Finite Element Analysis
- 257. Structural Optimization
- 258. Analysis of Dynamic and Nonlinear Behavior of Structures
- 265. Advanced Topics in Civil and Environmental Engineering
- 281. Experimental Systems
- 283. Structural Dynamics
- 301, 302. Fall and Spring Seminars
- 399. Special Readings in Civil and Environmental Engineering

Courses Currently Unscheduled

- 202. Advanced Mechanics of Solids II
- 221. Incompressible Fluid Flow
- 222. Open Channel Flow
- 223. Flow Through Porous Media
- 226. Operational Hydrology
- 231. Structural Engineering Analysis
- 232. Reinforced Concrete Design
- 234. Advanced Structural Design in Metals
- 238. Rock Mechanics
- 239. Physical Properties of Soils
- 247. Air Pollution Control
- 337. Elements of Soil Dynamics
- 350. Advanced Engineering Analysis

Electrical Engineering

Professor H. Craig Casey, Jr., Ph.D. (Stanford), *Chairman*

Professor Peter N. Marinos, Ph.D. (North Carolina State), *Director of Graduate Studies*

Professors

Richard B. Fair, Ph.D. (Duke); William T. Joines, Ph.D. (Duke); Robert B. Kerr, Ph.D. (Johns Hopkins); Loren W. Nolte, Ph.D. (Michigan); Theo C. Pilkington, Ph.D. (Duke); Kishor S. Trivedi, Ph.D. (Illinois); Paul P. Wang, Ph.D. (Ohio State); Thomas G. Wilson, Sc.D. (Harvard)

Associate Professors

Herbert Hacker, Ph.D. (Michigan); Gershon Kedem, Ph.D. (Wisconsin); Hisham Z. Massoud, Ph.D. (Stanford)

Assistant Professors

Dimitri Alexandrou, Ph.D. (California-San Diego); John A. Board, Jr., Ph.D. (Oxford); Apostolos Dollas, Ph.D. (Illinois); Joanne Bechta Dugan, Ph.D. (Duke); Rhett T. George, Jr., Ph.D. (Florida); Ronald C. Wong, Ph.D. (Duke)

Research Assistant Professor

Karen Z. Frenzel, Ph.D. (Duke)

Professor Emeritus

Harry A. Owen, Jr., Ph.D. (North Carolina State)

A student may specialize in any one of the following fields in working toward either the M.S. or the Ph.D. degree with a major in electrical engineering: computer-aided design, computer engineering, detection and estimation theory, digital signal processing, electromagnetic fields and microwaves, integrated circuit design and fabrication, microprocessor systems, robotics and control systems, solid-state devices and materials, solid-state power conditioning, and VLSI circuit design.

Recommended prerequisites for the graduate courses in electrical engineering include a knowledge of basic mathematics and physics, electric networks, and system theory. Students in doubt about their background for enrollment in specific courses should discuss the matter with the Director of Graduate Studies. The M.S. degree program includes either a thesis or a project and an oral examination. A qualifying examination is required for the Ph.D. degree program. This examination is intended to test both the breadth and depth of the student's understanding of basic electrical engineering concepts. There is no foreign language requirement.

Courses of Instruction

- 202. Digital Communication Systems
- 203. Random Signals and Noise
- 204. Computer Network Architecture
- 205. Signal Detection and Extraction Theory
- 206. Digital Signal Processing
- 207. Fault-Tolerant and Testable Computer Systems
- 208. Digital Computer Architecture and Design
- 209. Microprocessor Fundamentals and Applications
- 210. Introduction to VLSI Systems
- 211. Quantum Mechanics
- 213. Modern Optics
- 214. Introduction to Solid-State Physics
- 216. Devices for Integrated Circuits
- 218. Integrated Circuit Engineering
- 219. Digital Integrated Circuits
- 225. Microwave Electronic Circuits
- 234. Power Electronics: High-Power Circuits
- 235. Nonlinear Magnetic and Semiconductor Power Converters
- 236. Energy-Storage Power Converters
- 241. Linear Systems
- 250. Introduction to Robotics
- 251. Pattern Classification and Recognition
- 252. Computer Systems Organization
- 265. Advanced Topics in Electrical Engineering

- 271. Electromagnetic Theory
- 272. Electromagnetic Communication Systems
- 273. Optical Communication Systems
- 308. Advanced Topics in Digital Systems
- 310. CMOS VLSI Design
- 316. Advanced Physics of Semiconductor Devices
- 320. Integrated Circuit Fabrication Laboratory
- 333. Electronic Properties of Submicron Solid-State Devices
- 399. Special Readings in Electrical Engineering

Courses Currently Unscheduled

- 215. Semiconductor Physics
- 217. Lasers
- 222. Nonlinear Analysis
- 224. Advanced Electronic Circuits
- 226. Modeling/Computer-Aided Analysis of Electronic Systems
- 302. Applied Information Theory and Statistical Estimation
- 305. Advanced Topics in Signal Processing
- 317. Quantum Electronics
- 324. Nonlinear Oscillations in Physical Systems
- 342. Optimal Control Theory
- 371. Advanced Electromagnetic Theory
- 373. Selected Topics in Field Theory

Mechanical Engineering and Materials Science

Professor Robert M. Hochmuth, Ph.D. (Brown), *Chairman*

Professor Charles M. Harman, Ph.D. (Wisconsin), *Director of Graduate Studies*

Professors

Adrian Bejan, Ph.D. (Massachusetts Inst. of Tech.); Jack B. Chaddock, Sc.D. (Massachusetts Inst. of Tech.); Franklin H. Cocks, Sc.D. (Massachusetts Inst. of Tech.); Earl H. Dowell, Sc.D. (Massachusetts Inst. of Tech.); Devendra P. Garg, Ph.D. (New York Univ.); Ulrich M. Gosele, Ph.D. (Max Planck Institut fur Metallforschung, Stuttgart); George W. Pearsall, Sc.D. (Massachusetts Inst. of Tech.); Edward J. Shaughnessy, Jr., Ph.D. (Virginia); Marion L. Shepard, Ph.D. (Iowa State); Teh Yu Tan, Ph.D. (California at Berkeley)

Associate Professors

Donald B. Bliss, Ph.D. (Massachusetts Institute of Technology); Phillip L. Jones, Ph.D. (California at Los Angeles); Alician V. Quinlan, Ph.D. (Massachusetts Inst. of Tech.); Donald Wright, Ph.D. (Purdue)

Assistant Professors

Gale H. Buzzard, Ph.D. (North Carolina State); Josiah Doss Knight, Ph.D. (University of Virginia); David Needham, Ph.D. (University of Nottingham)

Research Assistant Professor

Roger Tran-Son-Tay, D.Sc. (Washington University)

The department offers programs of study and research leading to the M.S. and Ph.D. degrees in both Mechanical Engineering and Materials Science. Current research areas available include: The dynamics of nonlinear fluid and structural systems and their associated limit cycle and chaotic motions, aerodynamics and methods of predicting stability, aircraft noise reduction, unsteady aerodynamics, turbulent flow processes, flow

with deformable boundaries, computational methods in Lagrangian fluid mechanics, elastic and viscous properties of blood cells, diffusion through membranes, structure and properties of biological membranes, thermal design by entropy minimization, diffusion and point defects in semi-conductors, non-destructive testing through position annihilation spectroscopy, the fine structure of permanent magnet material, secondary transitions, relaxation and aging of selected polymers, interpenetrating polymer networks, mechanical properties of kidney stones, energy efficient building technology, heat and mass transfer in air conditioning processes and in random porous media, bifurcation phenomena in fluid mechanics and heat transfer, artificial intelligence and expert systems, robotics, control of vibrations, lubrication, design of bioreactors and bioprocess engineering.

Courses of Instruction

202. Engineering Thermodynamics
 205. Biochemical Engineering
 206. Optimization of Bioprocess Kinetics
 210. Intermediate Dynamics
 211. Theoretical and Applied Polymer Science
 212. Electronic Materials
 214. Corrosion and Corrosion Control
 215. Biomedical Materials and Artificial Organs
 217. Fracture of Engineering Materials
 218. Thermodynamics of Electronic Materials
 221. Compressible Fluid Flow
 226. Intermediate Fluid Mechanics
 227. Advanced Fluid Mechanics
 230. Modern Control and Dynamic Systems
 236. Engineering Acoustics and Noise Control
 240. Patent Technology and Law for Engineers
 245. Applications in Expert Systems
 265. Advanced Topics in Mechanical Engineering
 270. Robot Control and Automation
 277. Optimization Methods for Mechanical Design

280. Convective Heat Transfer
 281. Conduction and Radiation Heat Transfer
 325. Aeroelasticity
 331. Nonlinear Control Systems
 399. Special Readings in Mechanical Engineering

Courses Currently Unscheduled

213. Advanced Materials Science
 216. Materials Science and Solar Technology
 224. An Introduction to Turbulence
 225. Mechanics of Viscous Fluids
 235. Advanced Mechanical Vibrations
 300. Advanced Projects in Mechanical Engineering
 302. Advanced Thermodynamics
 311. Behavior of Crystalline Solids
 327. Homogeneous Turbulence
 328. Turbulent Shear Flow
 333. Seminar in Control Systems
 335. Analytical Methods in Vibrations

English

Professor Stanley Fish, Ph.D. (Yale), *Chairman*

Professor Marianna Torgovnick, Ph.D. (Columbia), *Assistant Chairman*

Professor Oliver W. Ferguson, Ph.D. (Illinois), *Director of Graduate Studies*

Professors

Carl Anderson, Ph.D. (Pennsylvania); James Applewhite, Ph.D. (Duke); Louis J. Budd, Ph.D. (Wisconsin), *James B. Duke Professor of English*; A. Leigh DeNeef, Ph.D. (Pennsylvania State); Robert F. Gleckner, Ph.D. (Johns Hopkins); Wallace Jackson, Ph.D. (Pennsylvania); Frank Lentricchia, Ph.D. (Duke); Holger O. V. Nygard, Ph.D. (California at Berkeley); Annabel Patterson, Ph.D. (London); Lee Patterson, Ph.D. (Yale); Reynolds Price, B.Litt. (Oxford); Dale B. J. Randall, Ph.D. (Pennsylvania); Clyde de Loache Ryals, Ph.D. (Pennsylvania); Barbara Herrnstein Smith (Brandeis); Grover C. Smith, Ph.D. (Columbia); Victor H. Strandberg, Ph.D. (Brown); Jane Tompkins, Ph.D. (Yale); George W. Williams, Ph.D. (Virginia); Kenny J. Williams, Ph.D. (Pennsylvania)

Associate Professors

Ronald R. Butters, Ph.D. (Iowa); John Clum, Ph.D. (Princeton); Gerald E. Gerber, Ph.D. (Northwestern); Buford Jones, Ph.D. (Harvard); Elgin W. Mellow, Ph.D. (London); Deborah Pope, Ph.D. (Wisconsin); Regina M. Schwartz, Ph.D. (Virginia)

Assistant Professors

Jane Gaines, Ph.D. (Northwestern); George D. Gopen, Ph.D. (Harvard); Michael Moon, Ph.D. (Johns Hopkins); Michael V. Moses, Ph.D. (Virginia); Joseph A. Porter, Ph.D. (California at Berkeley)

The department offers graduate work leading to the A.M. and Ph.D. degrees although normally students seeking only the A.M. degree are not admitted. If not already earned elsewhere, the A.M. degree may be taken en route to the Ph.D. and by students who elect to withdraw from the doctoral program. The A.M. degree is not required for

students pursuing the Ph.D. A statement of the requirements for the A.M. and Ph.D. degrees may be obtained from the Director of Graduate Studies. The department requires a reading knowledge of at least one foreign language for the Ph.D. degree; an additional language or languages may be required by the student's committee.

Courses of Instruction

- | | |
|--|---|
| <p>207. Old English Language and Literature
 208. History of the English Language
 209. Present-Day English
 212. Middle English Literature: 1100 to 1500
 221. Renaissance Prose and Poetry: 1500 to 1660
 225. Renaissance Drama: 1500 to 1642
 235. Restoration and Eighteenth-Century Literature: 1660 to 1800
 241. Romantic Literature: 1790 to 1830
 245. Victorian Literature: 1830 to 1900
 251. British Literature since 1900
 263. American Literature to 1865
 267. American Literature: 1865 to 1915
 269. American Women Writers
 275. American Literature since 1915
 281. Studies in Genre
 283. Feminist Theory and the Humanities
 285. Major Texts in the History of Literary Criticism
 288. Special Topics
 289. The Theory of the Novel
 310. Studies in Old English Literature
 312. Studies in Middle English Literature
 315. Studies in Chaucer
 321. Studies in Renaissance Literature
 324. Studies in Shakespeare</p> | <p>329. Studies in Milton
 337. Studies in Augustanism
 338. Studies in a Major Augustan Author
 341. Studies in Romanticism
 347. Studies in Victorianism
 348. Studies in a Major Nineteenth-Century Author
 353. Studies in Modern British Literature
 361. Studies in American Literature before 1915
 368. Studies in a Major American Author before 1915
 375. Studies in Modern American Literature
 376. Studies in a Modern Author (British or American)
 381. Special Topics Seminar
 383. Studies in Textual Criticism
 385. Studies in Literary Criticism
 386. Problems in the Theory of Value and Judgment
 390. Composition Theory and Pedagogy
 391. Tutorial in Special Topics
 392. Tutorial in Journal Editing</p> |
|--|---|

Courses Currently Unscheduled

380. Studies in Ballad and Folksong
 393. Professionalism, Theory and Power in Legal and Literary Studies

Tutorials

Specialized subjects of study may be offered, numbered in the 390s, to accommodate the interests of advanced graduate students. Tutorials may be offered to single students or to small groups. Instruction will be conducted in weekly sessions, or in more frequently scheduled sessions, if the instructor wishes. Emphasis will be on independent reading and investigation, and oral and written reports. A substantial amount of writing will be required.

Students are advised to consult the Director of Graduate Studies about the availability of tutorials.

Forestry and Environmental Studies

Professor George F. Dutrow, Ph.D. (Duke), *Dean*

Professor William J. Stambaugh, Ph.D. (Yale), *Director of Graduate Studies*

Professors

Kenneth R. Knoerr, Ph.D. (Yale); Curtis J. Richardson, Ph.D. (Tennessee)

Associate Professors

Norman L. Christensen, Jr., Ph.D. (California at Santa Barbara); Kenneth H. Reckow, Ph.D. (Harvard)

Assistant Professors

Bruce C. Faust, Ph.D. (Calif. Inst. of Tech.); Richard T. Di Giulio, Ph.D. (Virginia Polytechnic Inst.); Lynn A. Maguire, Ph.D. (Utah State); Ram Oren, Ph.D. (Oregon State); Peter J. Parks, Ph.D. (California at Berkeley)

Professors Emeriti

Roger F. Anderson, Ph.D. (Minnesota); Henry Hellmers, Ph.D. (California at Berkeley); Jane Philpott, Ph.D. (Iowa); James G. Yoho, Ph.D. (Michigan State)

Adjunct Professors

Stephen G. Boyce, Ph.D. (North Carolina State); William K. Condrell, J.D. (Harvard); Michael P. Dieter, Ph.D. (University of Mississippi); William Sizemore, Ph.D. (University of Georgia); Harold K. Steen, Ph.D. (University of Washington)

Adjunct Associate Professor

Robert G. Healy, Ph.D. (California at Los Angeles)

Adjunct Assistant Professor

Ralph Joseph Alig, Ph.D. (Oregon State)

Major and minor work is offered in the areas of natural resource science/ecology, natural resource systems science, and natural resource economics/policy. Programs of study and research lead to the A.M., M.S., and Ph.D. degrees. College graduates who have a bachelor's degree in one of the natural or social sciences, forestry, engineering, business, or environmental science will be considered for admission to a degree program. Students will be restricted to the particular fields of specialization for which they are qualified academically. Graduate School programs usually concentrate on some area of natural resource science/ecology, systems science, or economics/policy, while study in resource management is more commonly followed in one of the professional master's degree programs of the School of Forestry and Environmental Studies. For more complete program descriptions and information on professional training in forestry or environmental studies, the *Bulletin of Duke University: School of Forestry and Environmental Studies* should be consulted.

The specific degrees available in forestry and related natural resources through the Graduate School are: the A.M. (with or without a thesis), M.S. (with a thesis), and the Ph.D. Students majoring in forestry or environmental studies may be required to demonstrate satisfactory knowledge of one or two foreign languages for the Ph.D. degree.

Courses of Instruction

- 200. Student Projects
- 201. Field Studies
- 204. Forest Inventory, Growth, and Yield
- 205. Silviculture
- 207. Forest Pest Management
- 208. Fire Behavior and Use
- 210L. Forest Pathology
- 211L. Applied Ecology and Ecosystem Management
- 213. Forest Ecosystems
- 215. Environmental Physiology
- 216. Applied Population Ecology
- 218. Barrier Island Ecology
- 221L. Forest Soils
- 230. Weather and Climate
- 231. Environmental Climatology
- 232. Microclimatology
- 234. Watershed Hydrology
- 236. Water Quality Management
- 237. Watershed Modeling and Management
- 242. Environmental Chemistry
- 251. Natural Resource Data Analysis
- 261. Remote Sensing for Resource Management
- 262. Forest Utilization
- 266. Ecology of Southern Appalachian Forests
- 267. Wildland and Wildlife Management
- 269. Business Aspects of Natural Resource Management
- 270. Resource Economics and Policy
- 283. Environmental Policy and Values
- 285. Land Use Principles and Policies
- 299. Independent Projects
- 301. Forest Nutrition Management
- 302. Models in Forestry
- 305. Harvesting Effects on Productivity
- 306. Dynamic Modeling of Forest Management Strategies
- 307. Ecophysiology of Productivity and Stress
- 311. Ecological Toxicology
- 312. Wetlands Ecology
- 316. Case Studies in Environmental Management
- 322. Microbiology of Forest Soils

- 330L. Environmental Monitoring and Instrumentation
- 331. Water Resource Systems
- 332. Air Quality Management
- 335. Water Quality Modeling
- 350. Applied Regression Analysis
- 355. Optimization Methods for Resource Management
- 357. Systems Ecology and Modeling
- 361. Forest Resource Management
- 363. International Trade and Forest Investment
- 366. Mathematical Modeling of Lake and Reservoir Water Quality
- 367. Seminar in Forest Resource Management
- 372, 373. Advanced Natural Resource Economics
- 381. Natural Resource Policy
- 385. Decision Theory and Risk Analysis
- 388. Seminar in Resource and Environmental Policy
- 389. Seminar in Forest and Conservation History

Courses Currently Unscheduled

- 209. Forest Entomology
- 212. Ecosystem Dynamics in Forest Productivity
- 252. Computer Applications in Forestry
- 263. Harvesting and Transportation Systems
- 264. Manufacturing Systems
- 304. Forest Yield
- 308. Tree Biology
- 309. Forest Regeneration
- 310. Forest Productivity and Mineral Cycling
- 314. Integrated Case Studies in Toxicology
- 315. Effects of Pollutants on Ecosystems
- 317. Applied Ecological Problem Solving
- 318. Seminar in Ecotoxicology
- 319. Seminar in Natural Resource Ecology
- 320. Seminar in Integrated Case Studies in Natural Resource Analysis
- 325. Ecologic Effects of Acid Deposition
- 338. Micrometeorology and Biometeorology Seminar
- 384. Special Tax Problems for Industrial Timberland Owners

The University Program in Genetics

Professor Janis Antonovics, Ph.D. (Univ. Coll. of North Wales), *Director*

Professors

D. Bernard Amos, M.D. (Guys Hospital, London); Deepak Bastia, Ph.D. (Chicago); John E. Boynton, Ph.D. (California at Davis); Sheila Counce, Ph.D. (Univ. of Edinburgh); Nicholas Gillham, Ph.D. (Harvard); Samson R. Gross, Ph.D. (Columbia); Walter R. Guild, Ph.D. (Yale); Wolfgang Karl Joklik, D. Phil. (Univ. of Oxford), *James B. Duke Professor of Microbiology and Immunology*; Nicholas M. Kredich, M.D. (Michigan); Paul L. Modrich, Ph.D. (Stanford); Montrose J. Moses, Ph.D. (Columbia); R. Bruce Nicklas, Ph.D. (Columbia); Michael C. Ostrowski, Ph.D. (South Carolina at Columbia); Calvin L. Ward, Ph.D. (Texas); Frances Ellen Ward, Ph.D. (Brown); Robert E. Webster, Ph.D. (Duke)

Associate Professors

Sharyn Endow, Ph.D. (Yale); Ronald C. Greene, Ph.D. (California Inst. of Tech.); Arno L. Greenleaf, Ph.D. (Harvard); Michael S. Hershfield, M.D. (Pennsylvania); Tao-shih Hsieh, Ph.D. (California at Berkeley); Jack D. Keene, Ph.D. (Washington at Seattle); Cathy C. Laurie, Ph.D. (Minnesota); Elwood A. Linney, Ph.D. (California at San Diego); Mark D. Rausher, Ph.D. (Cornell); Deborah A. Steege, Ph.D. (Yale)

Assistant Professors

Mary Vickers Burdett, Ph.D. (Georgetown); Edward W. Holmes, M.D. (Pennsylvania); Stephen A. Johnston, Ph.D. (Wisconsin); Russel E. Kaufman, M.D. (Ohio State University); Kenneth N. Kreuzer, Ph.D. (University of Chicago); Frederick H. Schachat, Ph.D. (Stanford); Marcy K. Uyenoyama, Ph.D. (Stanford)

Adjunct Professors

John W. Drake, Ph.D. (California Inst. of Tech.); Burke H. Judd, Ph.D. (California Inst. of Tech.); Thomas Kunkel, Ph.D., (Cincinnati); John Charles Lucchesi, Ph.D. (California at Berkeley); Michael A. Resnick, Ph.D. (University of California at Berkeley); Akio Sugino, Ph.D. (Nagoya University, Japan)

The University Program in Genetics provides a coherent course of study in all facets of biology related to genetics. Graduate students registered in any of the biological sciences departments may apply to the faculty of the genetics program to pursue study and research leading to an advanced degree. It would be helpful if applicants for admission to the Graduate School indicated their interest in the genetics program at the time of application. Requests for information describing more completely the research interests of the staff, facilities, and special stipends and fellowships should be addressed to the Director, Genetics Program (Department of Botany).

Courses of Instruction

205. Molecular Biology
215. Molecular Genetics I: Genetic Mechanisms
268. Molecular Biology II: Nucleic Acids
280. Principles of Genetics
281S. DNA, Chromosomes, and Evolution
283. Extrachromosomal Inheritance

285S. Ecological Genetics
286. Evolutionary Mechanisms
288. Mathematical Population Genetics
336. Contemporary Topics in Immunogenetics
350. Genetics Colloquium

Geology

Professor Ronald D. Perkins, Ph.D. (Indiana), *Chairman*

Professor S. Duncan Heron, Jr., Ph.D. (North Carolina at Chapel Hill), *Director of Graduate Studies*

Professor

Orrin H. Pilkey, Ph.D. (Florida State), *James B. Duke Professor of Geology*

Associate Professors

Paul A. Baker, Ph.D. (California at San Diego); Bruce Hayward Corliss, Ph.D. (Univ. of Rhode Island); Thomas C. Johnson, Ph.D. (California at San Diego); Jeffrey A. Karson, Ph.D. (SUNY); Bruce R. Rosendahl, Ph.D. (California at San Diego)

Assistant Professor

Richard A. Strelitz, Ph.D. (Princeton)

The Department of Geology offers graduate work leading to the M.S. and Ph.D. degrees. An undergraduate degree in geology is not a prerequisite for graduate studies, but a student must have had or must take a summer field geology course (or equivalent experience), mineralogy, igneous and metamorphic rocks, stratigraphy or sedimentation, and structural geology. In addition, the student must have had one year of college chemistry, one year of college physics, and mathematics through calculus.

Graduate courses in the Department of Geology provide specialized training in the fields of facies analysis, sedimentary petrology, geological oceanography and limnology, coastal geology, micropaleontology, paleoceanography, geophysics, low-temperature geochemistry; igneous petrology, high-temperature geochemistry, and structural geology and tectonics.

An acceptable thesis is required. There is no language requirement for the M.S. degree.

Courses of Instruction

200. Beach and Coastal Processes
 203. Physical Oceanography
 206S. Principles of Geological Oceanography
 208S. Paleoceanography
 209. Marine Sediments
 212. Carbonate Facies Analysis: Recent and Ancient
 214S. Sedimentary Petrography
 215. Clastics Facies Analysis: Recent and Ancient
 216. Field Analysis of South Florida Carbonates
 217. Field Analysis of Ancient Sedimentary Sequences
 230. Advanced Structural Geology
 233. Oceanic Crust and Ophiolites
 236. Lithosphere Plate Boundaries
 239. Advanced Topics in Structural Geology and Tectonics
 249. Marine Micropaleontology

251. Physics of the Earth
 252. Exploration Seismology
 255. Seismic Interpretation
 260S. Hydrocarbon Exploration
 270. Sedimentary Geochemistry
 271. Isotope Geochemistry
 272. Biogeochemistry
 281S. Advanced Topics In Igneous Petrology
 283S. Experimental Methods in Geology
 292. Computer Methods in Geology
 295S. Advanced Topics in Geology
 371, 372. Advanced Topics in Geology

Courses Currently Unscheduled

204. Chemical Oceanography
 253S. Geophysics
 275. Economic Geology

Germanic Languages and Literature

Associate Professor Frank Borchardt, Ph.D. (Johns Hopkins), *Chairman*
 Professor James L. Rolleston, Ph.D. (Yale), *Director of Graduate Studies*

Associate Professor

A. Tilo Alt, Ph.D. (Texas)

Assistant Professors

Michael M. Morton, Ph.D. (Virginia); Ann Marie Rasmussen, Ph.D. (Yale)

Professor Emeritus

Leland R. Phelps, Ph.D. (Ohio State)

The Department of Germanic Languages and Literature offers graduate work leading to the A.M. degree. Students who expect to major in German should have had sufficient undergraduate courses in Germanic languages to enable them to proceed to more advanced work.

Students who wish to take courses in German as a related field should normally have completed a third-year course (in exceptional cases, a second year) of college German with acceptable grades.

Courses of Instruction

200S. Proseminar
 201S, 202S. Goethe
 205, 206. Middle High German
 207S. German Romanticism
 209S. Drama
 210. The Eighteenth Century
 211S. Nineteenth-Century Literature
 214S. The Twentieth Century
 215S. Seventeenth-Century Literature

216. History of the German Language
 217S. Renaissance and Reformation Literature
 218S. The Teaching of German
 219. Applied Linguistics
 230S. Lyric Poetry

Courses Currently Unscheduled

321, 322. Germanic Seminar

Health Administration

Professor J. Alexander McMahon, J.D. (Harvard), *Chairman*

Associate Professor Robert Taylor, Ph.D. (North Carolina at Chapel Hill), *Director of Graduate Studies*

Professors

B. Jon Jaeger, Ph.D. (Duke); David G. Warren, J.D. (Duke)

Associate Professor

David J. Falcone, Ph.D. (Duke)

Assistant Professor

Donald S. Smith, M.H.A. (Minnesota)

Consultant

Robert E. Toomey, LL.D. (Clemson)

Adjunct Associate Professor

Robert G. Winfree, M.A. (Iowa)

Adjunct Assistant Professors

William J. Donelan, M.S. (Duke); Anne L. Martin, Ph.D. (London); John Kevin Moore, J.D. (University of Minnesota); Duncan Yaggy, Ph.D. (Brandeis)

The Department of Health Administration offers graduate work leading to the M.H.A. degree. The graduate program is offered through two academic years and leads principally toward a career in the corporate management of hospitals and other health care delivery organizations. Students without previous administrative experience in the health field are encouraged to apply for a twelve-month administrative fellowship following graduation. Admission to the program is based upon the capability for graduate study and demonstrated leadership potential of the candidate.

Courses of Instruction

- 301. Health System and the Environment
- 302. Organizational Behavior in Health Systems
- 303, 304. Health Systems and the Environment—Laboratory
- 311, 312. Leadership Seminar
- 321, 322. Strategic Planning for Health Services
- 325. Health Law for Management
- 327. Financial Management for Health Care Organizations
- 331. Human Resources Management

- 341, 342. Advanced Seminar in Health Care Institutional Management
- 343. Comparative Health Systems
- 352. Health Services for the Aged
- 354. Quality Assurance, Risk Management, and Liability Insurance
- 356. Health Policy Analysis
- 358. Cost Benefit Analysis
- 362. Planning and Managing Alternative Delivery Systems
- 371, 372. Directed Research

History

Professor Warren Lerner, Ph.D. (Columbia), *Chairman*

Professor Seymour Mauskopf, Ph.D. (Princeton), *Director of Graduate Studies*

Professors

Clark R. Cahow, Ph.D. (Duke); John Cell, Ph.D. (Duke); William Chafe, Ph.D. (Columbia); Joel G. Colton, Ph.D. (Columbia); Calvin D. Davis, Ph.D. (Indiana); Robert F. Durden, Ph.D. (Princeton); Irving B. Holley, Jr., Ph.D. (Yale); Bruce R. Kuniholm, Ph.D. (Duke); John F. Oates, Ph.D. (Yale); John F. Richards, Ph.D. (California at Berkeley); Alex Roland, Ph.D. (Duke); Anne Firor Scott, Ph.D. (Radcliffe); William E. Scott, Ph.D. (Yale); John J. TePaske, Ph.D. (Duke); Ronald Witt, Ph.D. (Harvard); Charles R. Young, Ph.D. (Cornell)

Associate Professors

Arif Dirlik, Ph.D. (Rochester); Peter C. English, M.D., Ph.D. (Duke); David Barry Gaspar, Ph.D. (Johns Hopkins); Raymond Gavins, Ph.D. (Virginia); Lawrence C. Goodwyn, Ph.D. (Texas); Andrew Gordon, Ph.D. (Harvard); Alexander Keyssar, Ph.D. (Harvard); Claudia Koonz, Ph.D. (Rutgers); Martin Miller, Ph.D. (Chicago); Sydney Nathans, Ph.D. (Johns Hopkins); William M. Reddy, Ph.D. (Chicago); Peter H. Wood, Ph.D. (Harvard)

Assistant Professors

Richard Davis, Ph.D. (Princeton); Janet J. Ewald, Ph.D. (Wisconsin); Monica Green, Ph.D. (Princeton); Cynthia B. Herrup, Ph.D. (Northwestern); Kristen B. Neuschel, Ph.D. (Brown University); Thomas Robisheaux, Ph.D. (Virginia);

Professors Emeriti

Arthur Ferguson, Ph.D. (Cornell); John Hope Franklin, Ph.D. (Harvard), *James B. Duke Professor Emeritus of History*; Harold T. Parker, Ph.D. (Chicago); Richard A. Preston, Ph.D. (Yale); Theodore Ropp, Ph.D. (Harvard); Richard L. Watson, Ph.D. (Yale)

The Department of History offers graduate work leading to the A.M. and Ph.D. degrees. Candidates for the A.M. degree must have a reading knowledge of at least one ancient or modern foreign language related to their programs of study and have completed successfully a substantial research paper, or two seminar papers, normally the product of a year's seminar or two semester courses. The paper(s) must be approved by two readers, the supervising professor and a second professor from the graduate staff. Students anticipating a May degree must have their papers read and approved by April 15; those anticipating a September degree must have their papers read and approved by August 1.

Candidates for the degree of Doctor of Philosophy prepare themselves for examinations in four fields, at least three of which shall be in history. The choice of fields is determined in consultation with the student's supervisor and the Director of Graduate Studies. The department offers graduate instruction in the fields of Africa, Afro-American history, ancient history, medieval and early modern Europe, modern Europe, American history, Britain and the Commonwealth, Imperial Russia, Soviet Russia, Latin America, South Asia, China, modern Japan, military history, history of science, and history of medicine. The candidate for the Ph.D. degree must have a reading knowledge of two foreign languages to be picked in conjunction with the candidate's supervisor. In certain cases, an alternative to the second language may be chosen if approved by both the candidate's supervisor and the Director of Graduate Studies. Such an alternative must take the form of successful completion of a course or courses which would appreciably increase the candidate's methodological proficiency; such as a graduate course in statistics, archaeology, demography, numismatics, cartography, or a summer training program for developing methodological skills. A course or courses in a discipline outside history—anthropology, literature, sociology, political science, ecology, geography, etc.—will not necessarily qualify as an alternative to a second language. Also, the alternative must be in addition to any previous undergraduate work in the methodology. Whether satisfied by two languages or by one language and an alternative, the requirement must be met prior to the preliminary examination.

Ancient History. For courses in ancient history which may be taken for credit in either history or classical studies, see Classical Studies.

Courses of Instruction

- | | |
|---|---|
| 201S. The Russian Intelligentsia and the Origins of the Revolution | 237S. Europe in the Early Middle Ages |
| 202S. The Russian Revolution | 238S. Europe in the High Middle Ages |
| 207, 208. Constitutional History of Britain: The Rise of the Common Law | 239S. History of Socialism and Communism |
| 215-216. The Diplomatic History of the United States | 241-242. United States Constitutional History |
| 217S, 218S. Western Europe in the Twentieth Century | 243-244. Marxism and History |
| 219S, 220S. History of Science and Technology | 245, 246. Social and Intellectual History of China |
| 221. Problems in the Economic and Social History of Europe, 1200-1700 | 247. History of Modern India and Pakistan, 1707-1857 |
| 222. Problems in the Intellectual History of the European Renaissance and Reformation | 248. History of Modern India and Pakistan, 1857 to the Present |
| 227-228. Recent United States History: Major Political and Social Movements | 249-250. Social and Intellectual History of the United States |
| 229S, 230S. Revolution in Modern Europe, 1789-1919 | 253S, 254S. European Diplomatic History, 1871-1945 |
| 231S, 232S. Problems in the History of Spain and the Spanish Empire | 259. Archaic Greece |
| 233. Slave Resistance and Social Control in New World Societies | 262. Problems in Soviet History |
| 234S. Political Economy of Development: Theories of Change in the Third World | 265S. Problems in Modern Latin American History |
| | 266. Late Antiquity |
| | 267S. England in the Sixteenth Century |
| | 268S. England in the Seventeenth Century |
| | 269S-270S. British History, Seventeenth Century to the Present |
| | 273S, 274S. Topics in the History of Science |
| | 277S. The Coming of the Civil War in the United States, 1820-1861 |

278S. The Civil War in the United States and Its Aftermath, 1861-1900
279, 280. Health, Healing, and History
282S. Canada
284S. Feminist Theory and the Social Sciences
285S, 286S. Oral History
301-302. Research Seminar in History

307-308. Seminar in United States History
312. Seminar in the Teaching of History in College
314. Historical and Social Science Methodology
351-352. Colloquia
371-372. Research Seminars
399. Independent Study

The Master of Arts Program in Humanities

Professor Charles R. Young (Cornell), *Director*

The Master of Arts Program in Humanities is an interdepartmental program and is tailored to the needs of individual students. The candidate defines a theme and selects appropriate course work with the aid and approval of a supervising committee. Thirty units of course work and proficiency in reading a foreign language are required for completion of the program. The degree may be earned with or without a thesis. The candidate who chooses not to submit a thesis will submit instead at least two substantial papers arising from course work for review by committee members, and meets with them to discuss his or her program in a final master's colloquium.

The program is open to holders of undergraduate degrees in any discipline who can demonstrate sufficient background in humanities to permit study at the graduate level. Admission is by regular application to the Graduate School. Students may enroll full time or part time (minimum of 3 units per term). Students considering entering the program may enroll in an appropriate graduate course or courses through the Office of Continuing Education, at the same time making their interests known to the Director of the Humanities Program.

The Master of Arts Program in Liberal Studies

This interdisciplinary program allows individuals with a variety of professional and personal educational interests the flexibility to pursue their interests across traditional disciplinary boundaries. The program is managed by an interdepartmental committee which advises students and directs their course of study. Students study primarily on a part-time basis and choose from an array of interdisciplinary courses developed specifically for this program. In addition to those courses, students may select other graduate-level courses that fit their individual needs and interests.

The MALS program consists of nine courses and a final project. These courses are offered during three academic terms (fall, spring, and summer). For more information on specific courses and other program requirements, a separate bulletin on the Master of Arts in Liberal Studies may be requested from the program director (120 Allen Building, Duke University, Durham, North Carolina 27706).

The Ph.D. Program in Literature

Professor Fredric Jameson, Ph.D. (Yale), *Chairman*

Professor Annabel Patterson, Ph.D. (London), *Director of Graduate Studies*

Faculty

A. Leigh DeNeef, Ph.D. (Pennsylvania State); Ariel Dorfman, Licencia en Filosofia (Univ. of Chile); Gustavo Pérez Firmat, Ph.D. (Michigan); Stanley Fish, Ph.D. (Yale); Frank Lentricchia, Ph.D. (Duke); Valentin Mudimbe, Ph.D. (Louvain); James Rolleston, Ph.D. (Yale); Barbara Herrnstein Smith, Ph.D. (Brandeis); Phillip Stewart, Ph.D. (Yale); Jean-Jacques Thomas, Doctorat de 3e Cycle (Univ. of Paris); Jane Tompkins, Ph.D. (Yale)

Resource Faculty (All have Ph.D.'s— available for advising and supervision of students)

Frank L. Borchardt, Peter Burian, Alice Kaplan, Francis Newton, Linda Orr, Lee Patterson, Clyde de L. Ryals, Marcel Tetel, Bruce Wardropper

The Graduate Program in Literature has as its goals the education of men and women who will be fully qualified to teach in departments of national literatures as well as in the humanities and other interdisciplinary programs. The program is not comparatist in the traditional sense but theoretical in focus, dedicated to the understanding of cultural history and the reshaping of literary studies in the context of contemporary thought. The program acknowledges the challenges posed by the emergence of non-Western literatures, by the increasing importance of oppositional cultures within the West (feminism, Marxism, discourse analysis), by the significance of new media such as film, and by the relationship between verbal and nonverbal arts such as painting and music. The newly-founded Duke Center for Critical Theory supplements and enhances the goals for the Graduate Program in Literature by annual conferences, special seminars, and lectures presented by international scholars and thinkers. A full descriptive brochure is available from Professor A. Patterson, Duke University, 305 Carr Building, Durham, North Carolina 27706.

Courses of Instruction

- | | |
|---|---|
| 251. History of Criticism | 285. Literature and Ideology |
| 252. Criticism and Literary Theory in the Twentieth Century | 286. Topics in Legal Theory |
| 253. Philology, Linguistics, and the Roots of Literature | 287. Problems in Narrative Analysis |
| 280. Semiotics for Literature | 288. Basic Issues in the History of Literary Theory |
| 281. Paradigms of Modern Thought | 289. Topics in Feminist Theory |
| 282. Contemporary Literary Theory | 290. Topics in Psychoanalytic Criticism |
| 283. Modernism | 291. Topics in Popular Culture and the Media |
| 284. The Intellectual as Writer | 292. Topics in Non-Western Literature and Culture |
| | 300. Value and Evaluation |

The University Program in Marine Sciences

Professor John D. Costlow, Ph.D. (Duke), *Director*

Professor Joseph S. Ramus, Ph.D. (California at Berkeley), *Assistant Director for Academic Programs and Director of Graduate Student Affairs*

Professors

John Gutknecht, Ph.D. (North Carolina at Chapel Hill); David R. McClay,* Ph.D. (North Carolina at Chapel Hill); Orrin Pilkey, † Ph.D. (Florida State); Richard B. Searles,* Ph.D. (California at Berkeley)

Associate Professors

Celia Bonaventura, Ph.D. (Texas); Joseph Bonaventura, Ph.D. (Texas); Richard B. Forward, Ph.D. (California at Santa Barbara); Thomas C. Johnson, Ph.D. (California at San Diego); J. Bolling Sullivan, Ph.D. (Texas); John P. Sutherland, Ph.D. (California at Berkeley)

Professor Emeritus

Cazlyn Green Bookhout, Ph.D. (Duke)

Graduate students from any and all academic disciplines are encouraged to take professional training at the Marine Laboratory. The program operates year-round, providing course work in the marine sciences, an active seminar program, and facilities supporting dissertation research. Resident graduate students represent the Departments of Biochemistry, Botany, Forestry and Environmental Studies, Geology, Physiology, and Zoology. Ordinarily, dissertation advisers are resident as well, although this need not

*In residence during summer only.

†In residence during spring only.

be the case. The Marine Laboratory has available several graduate student instructional assistantships and endowed fellowships during the academic year, including summer. In addition, tuition credits obtained from fellowship support may be applied to courses given both at the Marine Laboratory and the Durham campus.

Persons interested in graduate work in marine sciences should apply through one of the appropriate departments. Forms may be obtained from the Graduate School.

Applications for summer courses at the laboratory should be addressed to the Admissions Office, Duke University Marine Laboratory, Beaufort, North Carolina 28516. Additional information and the application form are included in the *Bulletin of Duke University: Marine Laboratory*. The application for enrollment in summer courses at the laboratory should be accompanied by transcripts of undergraduate and graduate work. Applications should be received as early as possible. Graduate students planning to enroll in courses or seminars offered during the fall or spring at the Marine Laboratory should notify the Admissions Office of the Marine Laboratory of such intent *prior* to the beginning of the respective semester.

Students registering for research should do so under the appropriate departmental numbers.

The following courses are offered at Beaufort. See the Marine Laboratory bulletin for the current schedule of courses.

Courses of Instruction

203. Physical Oceanography
203L. Marine Ecology
209S. Marine Sediments
209, 210. Independent Study
210. Individual Study
213L. Behavioral Ecology
216L. Biology of Marine Macrophytes
218. Barrier Island Ecology
250L. Physiology of Marine Animals
263L. Tropical Seaweeds
274L. Marine Invertebrate Zoology
278L. Invertebrate Developmental Biology
295S. Advanced Topics in Geology: Continental Margin Sedimentation

353, 354. Research
359, 360. Research
371, 372. Advanced Topics in Geology
_____. Seminar

Courses Currently Unscheduled

204. Chemical Oceanography
219L. Benthic Marine Algae
245L. Macromolecules, Ecology, and Evolution
247L. Plant Ecology
266S. Marine Biochemistry and Genetics
276. Comparative and Evolutionary Biochemistry

Mathematics

Professor Michael C. Reed, Ph.D. (Stanford), *Chairman*

Associate Professor Stephanos Venakides, Ph.D. (Courant), *Director of Graduate Studies*

Professors

William K. Allard, Ph.D. (Brown); J. Thomas Beale, Ph.D. (Stanford); Robert L. Bryant, Ph.D. (University of North Carolina), *Arts and Sciences Professor of Mathematics*; Phillip A. Griffiths, Ph.D. (Princeton); David G. Schaeffer, Ph.D. (Massachusetts Inst. of Tech.); Joseph R. Schoenfield, Ph.D. (Michigan); Seth L. Warner, Ph.D. (Harvard); Morris Weisfeld, Ph.D. (Yale)

Associate Professors

Donald S. Burdick, Ph.D. (Princeton); Richard E. Hodel, Ph.D. (Duke); Joseph W. Kitchen, Jr., Ph.D. (Harvard); David P. Kraines, Ph.D. (Univ. of California at Berkeley); Gregory F. Lawler, Ph.D. (Princeton); Lawrence C. Moore, Ph.D. (Cal. Tech.); David R. Morrison, Ph.D. (Harvard); William L. Pardon, Ph.D. (Princeton); Richard A. Scoville, Ph.D. (Yale); David A. Smith, Ph.D. (Yale)

Assistant Professors

Margaret Cheney, Ph.D. (Indiana); Carl Gardner, Ph.D. (Massachusetts Inst. of Tech.); Harold E. Layton, Ph.D. (Duke); Dana W. Nance, Ph.D. (Princeton); Vassilis Papanicolaou, Ph.D. (Stanford); Leslie Saper, Ph.D. (Princeton); Chadmark L. Schoen, Ph.D. (Chicago); Mark A. Stern, Ph.D. (Princeton)

Adjunct Professors

Jagdish Chandra, Ph.D. (Rensselaer)

Visiting Assistant Professor

Leah Edelstein, Ph.D. (Weizmann Inst. of Science, Rehovot, Israel)

Graduate work in the Department of Mathematics is offered leading to the A.M. and Ph.D. degrees. Admission to these programs is based on the applicant's undergraduate academic record, level of preparation for graduate study, the Graduate Record Examination, and letters of recommendation.

All A.M. and Ph.D. candidates are required to pass a qualifying examination after completing their first year of graduate study. The A.M. degree with a major in mathematics is awarded upon completion of 30 units of graded course work and passing the qualifying examination. A thesis may be substituted for 6 units of course work only under special circumstances.

Candidacy for the Ph.D. is established by passing the qualifying examination at the Ph.D. level, completing the department's language requirements, and passing an oral preliminary examination. The preliminary examination is normally taken at the beginning of the third year. The preliminary examination is conducted by a committee selected by the rules of the Graduate School and the department. The examination can, at the student's option, consist of questions based either on the student's course work at Duke or on the specific area of research plus a minor subject selected by the student.

After admission to candidacy, the Ph.D. degree is awarded on the basis of the student's scholarly ability as demonstrated by the dissertation and its defense. The dissertation is the most important requirement in the award of the Ph.D. degree.

Courses of Instruction

200. Introduction to Algebraic Structures I
 201. Introduction to Algebraic Structures II
 203. Basic Analysis I
 204. Basic Analysis II
 205. Topology
 206. Differential Geometry
 221, 222. Numerical Analysis I, II
 230. Mathematical Methods in Physics and Engineering I
 231. Mathematical Methods in Physics and Engineering II
 233. Asymptotic and Perturbation Methods
 234. Mathematics for Quantum Mechanics
 235. Topics in Mathematical Physics
 238, 239. Topics in Applied Mathematics
 240. Applied Stochastic Processes
 241. Linear Models
 242. Multivariate Statistics
 250. Introductory Mathematical Logic
 251. Set Theory I
 252. Set Theory II
 253. Recursion Theory
 258, 259. Topics in Logic
 260. Groups, Rings, and Fields
 261. Commutative Algebra
 268, 269. Topics in Algebra
 271. Algebraic Topology

273. Algebraic Geometry
 275. Differential Geometry
 276. Topics in Differential Geometry
 277. Topics in Algebraic Geometry
 278, 279. Topics in Topology
 280. Differential Analysis
 281. Real Analysis I
 282. Real Analysis II
 283. Linear Operators
 284. Topics in Functional Analysis
 285. Complex Analysis
 286. Topics in Complex Analysis
 288, 289. Topics in Analysis
 290. Probability
 293, 294. Topics in Probability Theory
 295. Fourier Analysis and Distribution
 296. Ordinary Differential Equations
 297. Partial Differential Equations I
 298. Partial Differential Equations II
 299. Topics in Partial Differential Equations
 378, 379. Current Research in Topology
 388, 389. Current Research in Analysis

Courses Currently Unscheduled

358-359. Current Research in Logic
 368-369. Current Research in Algebra
 387. Current Research in Mathematical Physics

Program in Medieval and Renaissance Studies

Professor Lee Patterson, Ph.D. (Yale), *Chairman*

Professor Charles R. Young, Ph.D. (Cornell), *Director of Graduate Studies*

The graduate Program in Medieval and Renaissance Studies is an interdisciplinary program administered by the Duke University Center for Medieval and Renaissance Studies. In consultation with the Director of Graduate Studies, students in the program select courses in art, history, music, philosophy, religion, language, and literature (classical studies, English, German, and Romance languages). The program is described in the section on special programs; for a description of individual courses see the large *Bulletin of Duke University: Graduate School*.

Courses of Instruction

Department of Art and Art History

- 230S. Medieval and Byzantine Art and Architecture
- 232S. Romanesque and Gothic Art and Architecture
- 240. Italian Art
- 242S. Studies in Italian Renaissance Art
- 243S. Studies in Northern Art

Department of Classical Studies

- 221. Medieval Latin

Department of English

- 208. History of the English Language
- 212. Middle English Literature: 1100 to 1500
- 221. Renaissance Prose and Poetry: 1500 to 1660
- 225. Renaissance Drama: 1500 to 1642
- 312. Studies in Middle English Literature
- 315. Studies in Chaucer
- 321. Studies in Renaissance Literature
- 324. Studies in Shakespeare
- 329. Studies in Milton
- 383. Textual Criticism

Department of Germanic Languages and Literature

- 205, 206. Middle High German
- 215S. Seventeenth-Century Literature
- 216. History of the German Language
- 217S. Renaissance and Reformation Literature

Department of History

- 207, 208. Constitutional History of Britain
- 222. Problems in the Intellectual History of the European Renaissance and Reformation
- 237S. Europe in the Early Middle Ages
- 238S. Europe in the High Middle Ages
- 267S-268S. From Medieval to Early Modern England

Department of Music

- 201. Introduction to Musicology
- 211. Medieval Notation
- 212. Renaissance Notation
- 222. Music in the Middle Ages
- 223. Music in the Renaissance
- 312S. Seminar in Renaissance Music
- 341S. History of Music Theory to Rameau
- 351S. Studies in Musical Iconography

Department of Philosophy

- 218S. Medieval Philosophy
- 219S. Late Medieval and Renaissance Philosophy

Department of Religion

- 219. Augustine
- 236. Luther and the Reformation in Germany
- 241. Problems in Reformation Theology
- 334. Theology and Reform in the Later Middle Ages
- 337. Theology of St. Thomas Aquinas
- 338. Calvin and the Reformed Tradition
- 339. The Radical Reformation

Department of Romance Languages

French

- 211. History of the French Language
- 248. French Literature of the Seventeenth Century
- 325. French Prose of the Sixteenth Century
- 326. Topics in Renaissance Poetry
- 391, 392. French Seminar (medieval and Renaissance topics)

Italian

- 284, 285. Dante

Spanish

- 210. History of the Spanish Language
- 251. The Origins of Spanish Prose Fiction
- 253. Cervantes
- 254. Drama of the Golden Age
- 258. Spanish Lyric Poetry before 1700
- 391, 392. Hispanic Seminar (medieval and Renaissance topics)

Courses Currently Unscheduled

- Classical Studies 327. Seminar in Byzantine History
- English 210. Old English Literary Tradition
- English 310. Studies in Old English Literature
- English 380. Studies in Ballad and Folksong
- Music 311S. Seminar in Medieval Music
- Religion 206. Christian Mysticism in the Middle Ages
- Religion 251. The Counter-Reformation and the Development of Catholic Dogma
- Religion 344. Zwingli and the Origins of Reformed Theology

Microbiology and Immunology

Professor Wolfgang Karl Joklik, D.Phil. (Univ. of Oxford), *James B. Duke Professor of Microbiology and Immunology and Chairman*

Professor Hilda Pope Willett, Ph.D. (Duke), *Director of Graduate Studies*

Professors

D. Bernard Amos, M.D. (Guys Hospital, London), *James B. Duke Professor of Immunology*; Deepak Bastia, Ph.D. (Chicago); Dani P. Bolognesi, Ph.D. (Duke); Rebecca Buckley, M.D. (North Carolina at Chapel Hill); Peter Cresswell, Ph.D. (University of London); David R. McClay, Ph.D. (North Carolina at Chapel Hill); Richard S. Metzgar, Ph.D. (Buffalo); Joseph R. Nevins, Ph.D. (Duke); Suydam Osterhout, M.D. (Duke), Ph.D. (Rockefeller University); Wendell F. Rosse, M.D. (Chicago); Hilliard F. Seigler, M.D. (North Carolina at Chapel Hill); Frances E. Ward, Ph.D. (Brown); Robert W. Wheat, Ph.D. (Washington)

Associate Professors

Dolph O. Adams, M.D., Ph.D. (North Carolina at Chapel Hill); Ronald B. Corley, Ph.D. (Duke); Jeffrey R. Dawson, Ph.D. (Case Western Reserve); Sharyn Endow, Ph.D. (Yale); Warner C. Greene, M.D., Ph.D. (Washington); Barton F. Haynes, M.D. (Baylor); Jack D. Keene, Ph.D. (Washington at Seattle); Elwood A. Linney, Ph.D. (California at San Diego); Thomas G. Mitchell, Ph.D. (Tulane); Harvey J. Sage, Ph.D. (Yale)

Assistant Professors

Yair Argon, Ph.D. (Harvard Medical School); C. Edward Buckley III, M.D. (Duke); Olivera J. Finn, Ph.D. (Stanford); Kenneth N. Kreuzer, Ph.D. (Chicago); Michael C. Ostrowski, Ph.D. (South Carolina at Columbia); David J. Pickup, Ph.D. (National Institute of Medical Research, London); David S. Pisetsky, M.D., Ph.D. (Albert Einstein)

Associate Medical Research Professors

Andrew E. Balber, Ph.D. (Rockefeller University); Sara E. Miller, Ph.D. (Georgia)

Assistant Medical Research Professors

Mary Vickers Burdett, Ph.D. (Georgetown); Kay H. Singer, Ph.D. (Duke)

The Department of Microbiology and Immunology offers graduate training leading to a Ph.D. degree. It is a participating department in interdisciplinary University Programs in Genetics and Cell and Molecular Biology, and in the Medical Scientist Training Program. Sixty-three predoctoral students and forty postdoctoral fellows are currently in residence.

The curriculum of the graduate program is designed to provide students with basic training in virology, prokaryotic and eukaryotic molecular cell biology, molecular genetics, and immunology. This part of the program, which takes from eight to sixteen months, is composed of formal course work and laboratory and library research. Research training is stressed throughout the program and is available in all of the 32 well-equipped research laboratories of the department. Expertise in a broad cross-section of molecular genetics and cell biology is represented, including techniques of DNA and RNA sequencing, genetic engineering, and hybridoma technology. Research programs are available in molecular virology, viral oncology, molecular cell biology, cellular differentiation and development, tumor cell biology, cell-surface immunochemistry, medical mycology, immunogenetics, tumor immunology, molecular immunology, and cellular immunology.

Undergraduate preparation in the biological and physical sciences and in biochemistry is required. A brochure describing the Ph.D. degree program, prerequisites for admission, financial support and research in the department may be obtained by writing the Director of Graduate Studies, Box 3020, Duke University Medical Center, Durham, North Carolina 27710.

Courses of Instruction

- | | |
|---|--|
| 214. Fundamentals of Electron Microscopy | 291. Comprehensive Immunology |
| 219. Molecular and Cellular Bases of Differentiation | 304. Molecular Membrane Biology |
| 221. Medical Microbiology | 310. Molecular Development |
| 234. Introduction to Biostatistical Methods | 323. Topics in Cell and Molecular Biology |
| 244. Principles of Immunology | 324. Topics in Molecular Genetics |
| 246S. Parasitic Diseases | 325. Medical Mycology |
| 252. General Virology and Viral Oncology | 330. Medical Immunology |
| 259. Molecular Biology I: Protein and Membrane Structure/Function | 331.1-331.8. Microbiology Seminar |
| 268. Molecular Biology II: Nucleic Acids | 332.1-332.8. Immunology Seminar |
| 269. Advanced Cell Biology | 336. Contemporary Topics in Immunogenetics |

Music

Professor Peter Williams, Ph.D., Litt.D. (Cambridge), *Chairman*

Professor Alexander Silbiger, Ph.D. (Brandeis), *Director of Graduate Studies*

Adjunct Assistant Professor John Druesedow, Jr., Ph.D. (Univ. of Indiana), *Director of Music Library*

Associate Professors

Tilman Seebass, Ph.D. (Univ. of Basel); R. Larry Todd, Ph.D. (Yale)

Assistant Professors

M. Elizabeth C. Bartlet, Ph.D. (Chicago); Bryan Gilliam, Ph.D. (Harvard); Paula Higgins, Ph.D. (Princeton); Robert Hill, Ph.D. (Harvard); Stephen Jaffe, A.M. (Pennsylvania)

The Department of Music offers graduate programs leading to the A.M. and Ph.D. degrees in musicology, the A.M. degree in composition, and the A.M. degree in performance practice. The department has traditionally emphasized the study of music within the framework of cultural and intellectual history. To this has been added more recently emphases on theory and analysis, and on performance practice. In addition, there is a strong interest, within both the composition and musicology programs, in opera and musical theater. Students are encouraged to include work outside their main area of concentration in their degree programs.

Nondegree students and especially graduate students from other departments may be admitted to graduate courses by consent of the instructor, according to their level of achievement in the proposed area of study. Students may be admitted to the Program in Medieval and Renaissance Studies (see section on Medieval and Renaissance Studies). A reading knowledge of one foreign language is required for the A.M. in composition, musicology, and performance practice; two languages are required for the Ph.D. (one of which will normally need to be German). For many dissertation topics a third language may be required. During their first term in residence, students in all degree programs will take an advisory test in basic harmony, counterpoint and score reading, as a result of which certain remedial work may be suggested by the Director of Graduate Studies. A detailed description of the requirements for the A.M. and Ph.D. is available upon request from the Director of Graduate Studies.

Courses of Instruction

- | | |
|--|---|
| 201. Introduction to Musicology | 236. Nineteenth-century Piano Music |
| 203. Proseminar in Performance Practice | 296S. Analysis of Contemporary Music |
| 211, 212. Notation | 297, 298, 299. Composition |
| 213. Theories and Notation of Contemporary Music | 317S. Seminar in the History of Music |
| 215. Music Analysis | 318S. Seminar in Performance Practice |
| 216. Analysis of Twentieth-Century Music | 331, 332, 333. Independent Study in Performance Practice and Interpretation |
| 222. Music in the Middle Ages | 341S. History of Music Theory to Rameau |
| 223. Music in the Renaissance | 351S. Studies in Musical Iconography |
| 224. Music in the Baroque Era | 361S. Musical Organology |
| 225. Music in the Classic Era | 382S. Studies in Ethnomusicology |
| 226. Music in the Nineteenth Century | 390. Independent Study |
| 227. Music in the Twentieth Century | |

The University Program in Neurobiology

Professor Irving T. Diamond, Ph.D. (Chicago), *Director*

Professors

Carl Erickson, Ph.D. (Rutgers); Doyle G. Graham, M.D., Ph.D. (Duke); William C. Hall, Ph.D. (Duke); George G. Somjen, M.D. (Univ. of New Zealand)

Associate Professors

Bernard Kaufman, Ph.D. (Indiana); J. Victor Nadler, Ph.D. (Yale)

Recent advances in neurobiology have resulted in new methods, such as immunohistochemistry, and in closer ties among the various approaches to studying the nervous system. For example, research on the neuroanatomical basis of behavior is more dependent than ever before on the chemical and cellular study of neurons. To keep pace with these changes the program in neurobiology has been designed for a small number of students who wish to study the nervous system at several levels, ranging from the molecular to the behavioral. In planning course work, each student will be guided by an advisory committee whose members come from a variety of departments. All students will be advised to take courses in neuroanatomy, neurophysiology, neuropharmacology, and neuropsychology. The heart of the training is a research apprenticeship that leads to a Ph.D. dissertation. A complete list of faculty, including research interests, will be made available to prospective students. *See course listings under the participating departments.*

Pathology

Professor Robert B. Jennings, M.D. (Northwestern), *James B. Duke Professor of Pathology and Chairman*
Professor Darell D. Bigner, M.D., Ph.D. (Duke), *Edwin L., Jr. and Lucille Finch Jones Cancer Research Professor of Pathology and Director of Graduate Studies*

Professors

Dolph O. Adams, M.D., Ph.D. (North Carolina at Chapel Hill); Sandra H. Bigner, M.D. (Tennessee); Edward H. Bossen, M.D. (Duke); William D. Bradford, M.D. (Western Reserve); Peter C. Burger, M.D. (Northwestern); Bernard F. Fetter, M.D. (Duke); Doyle G. Graham, M.D., Ph.D. (Duke); Donald B. Hackel, M.D. (Harvard); William W. Johnston, M.D. (Duke); Gordon K. Klintworth, M.D., Ph.D. (Univ. of Witwatersrand); John A. Koepke, M.D. (Wisconsin at Madison); George Michalopoulos, M.D., Ph.D. (Wisconsin); Salvatore V. Pizzo, M.D., Ph.D. (Duke); Philip Pratt, M.D. (Johns Hopkins); Joachim R. Sommer, M.D. (Munich); F. Stephen Vogel, M.D. (Western Reserve); Benjamin Wittels, M.D. (Minnesota)

Associate Professors

Jane G. Elchlepp, M.D. (Iowa), Ph.D. (Chicago); Kenneth Scott McCarty, Jr., M.D., Ph.D. (Duke); Keith Arnold Reimer, M.D., Ph.D. (Northwestern); Alfred P. Sanfilippo, M.D., Ph.D. (Duke); John D. Shelburne, M.D., Ph.D. (Duke); Peter Zwadyk, Jr., Ph.D. (Iowa)

Assistant Professors

John Lloyd Abernethy, Ph.D. (Duke); Randy L. Jirtle, Ph.D. (Wisconsin); Stanley C. Schold, Jr., M.D. (Arizona)

Adjunct Associate Professor

James A. Swenberg, D.V.M. (Minnesota), Ph.D. (Ohio State)

Adjunct Assistant Professor

Arnold R. Brody, Ph.D. (Colorado State)

Assistant Clinical Professor

Robin T. Vollmer, M.D. (Duke)

Associate Medical Research Professor

Carol J. Wikstrand, Ph.D. (North Carolina at Chapel Hill)

The Department of Pathology offers graduate work leading to the M.S. and Ph.D. degrees with areas of specialization such as subcellular and molecular pathology. Course work is designed to give a broad background in classical and modern pathology with emphasis on the application of modern research techniques. Students will be required to take such courses as are necessary to obtain a broad foundation, as well as courses applicable to areas of speciality and research. Further information including brochures giving details of departmental facilities, staff, trainee stipends, and the M.D.-Ph.D. program are available from the Director of Graduate Studies.

Courses of Instruction

- | | |
|---|---|
| 219. Molecular and Cellular Bases of Differentiation | 367. Special Topics in Pathology |
| 250. General Pathology | 369. Ophthalmic Pathology |
| 251. Laboratory Course in General Pathology | 370. Developmental Pathology and Teratology |
| 258. Cellular and Subcellular Pathology | 374. Pulmonary Pathology and Postmortem Pathophysiology |
| 275. Fundamentals of Electron Microscopy and Biological Microanalysis | 377. Pathology of the Kidney |
| 325. Cardiovascular Pathology | 380. Diagnostic Immunology |
| 353. Advanced Neuropathology | 381. Cancer Biology |
| 355. Graduate Seminar in Pathology | 382. General Pathology for Toxicologists |
| 357. Research in Pathology | |
| 361, 362. Autopsy Pathology | |
| 364. Systemic Pathology | |

Courses Currently Unscheduled

360. Cytochemistry

Pharmacology

Professor Norman Kirshner, Ph.D. (Pennsylvania State), *Chairman*
Professor Elliott Mills, Ph.D. (Columbia), *Director of Graduate Studies*

Professors

Mohamed Bahie Abou-Donia, Ph.D. (California at Berkeley); Everett H. Ellinwood, Jr., M.D. (North Carolina at Chapel Hill); Leon Lack, Ph.D. (Columbia); Daniel B. Menzel, Ph.D. (California at Berkeley); Athos Ottolenghi, M.D. (Univ. of Pavia); Saul M. Schanberg, Ph.D., M.D. (Yale); Theodore A. Slotkin, Ph.D. (Rochester); Walter D. Watkins, Ph.D. (Michigan), M.D. (Colorado); Pelham Wilder, Jr., Ph.D. (Harvard)

Associate Professors

James N. Davis, M.D. (Cornell); Cynthia Moreton Kuhn, Ph.D. (Duke); James O. McNamara, M.D. (Michigan); J. Victor Nadler, Ph.D. (Yale); Charles B. Nemeroff, Ph.D., M.D. (North Carolina at Chapel Hill); James Edward Nidel, M.D., Ph.D. (Miami); Gerald M. Rosen, Ph.D. (Clarkson Coll. of Tech.); Harold C. Strauss, M.D. (McGill); A. Richard Whorton, Ph.D. (Vanderbilt)

Assistant Professors

Clinton Donald Kilts, Ph.D. (Michigan State); Rochelle D. Schwartz, Ph.D. (Georgetown)

Professor Emeritus

Frederick Bernheim, Ph.D. (Univ. of Cambridge), *James B. Duke Professor Emeritus of Pharmacology*

Medical Research Professor

Gertrude B. Elion, D.M.Sc. (Brown)

Associate Medical Research Professor

Wilkie A. Wilson, Jr., Ph.D. (Duke)

Assistant Medical Research Professors

Jorge V. Bartolome, Ph.D. (Chile); Daniel M. Lapadula, Ph.D. (New York University); Frederic J. Seidler, Ph.D. (Duke); Robert L. Wolpert, Ph.D. (Princeton)

The Department of Pharmacology offers a graduate program which leads to the Ph.D. degree. Training is available in the areas of behavioral, biochemical, cardiovascular, developmental and endocrine pharmacology, neuropharmacology, and toxicology. Because pharmacology is an interdisciplinary field, the department gives serious consideration to applicants with strong undergraduate backgrounds in biological, chemical, and neural or behavioral sciences. There is no foreign language requirement.

Courses of Instruction

200. Pharmacology: Mode Action of Drugs
210, 211. Individual Study and Research
219. Tutorial in Pharmacology
233. Principles of Pharmacology and Toxicology I
254. Mammalian Toxicology
280. Student Seminar in Pharmacology
314. Integrated Case Studies in Toxicology
330. Pharmacological Basis of Clinical Medicine

331. Laboratory Methods in Pharmacology
347, 348. Seminar in Toxicology
360. Neuropharmacology
364. Neurotoxicology
370. Neurobiology I
372. Research in Pharmacology
417. Cellular Endocrinology

Philosophy

Professor David H. Sanford, Ph.D. (Cornell), *Chairman*

Associate Professor Carl J. Posy, Ph.D. (Yale), *Director of Graduate Studies*

Professors

Martin P. Golding, Ph.D. (Columbia); Edward P. Mahoney, Ph.D. (Columbia); William Bernard Peach, Ph.D. (Harvard)

Associate Professor

Robert N. Brandon, Ph.D. (Harvard), *Andrew W. Mellon Associate Professor of Philosophy*

Assistant Professors

Michael T. Ferejohn, Ph.D. (California at Irvine); Kathryn N. Jackson, Ph.D. (Toronto); Marshall R. Roderick, Ph.D. (Texas at Austin)

Professor Emeritus

Paul Welsh, Ph.D. (Cornell)

The Department of Philosophy offers graduate work leading to the A.M. and Ph.D. degrees. Tutorial work complements formal instruction. Students may, after taking a balanced program, specialize in any of the following fields: the history of philosophy, logic, philosophy of science, epistemology, metaphysics, philosophy of mind, philosophical analysis, ethics, aesthetics, political philosophy, philosophy of law, philosophy of medicine, and philosophy of religion.

Individual programs of study are developed for each student. Prior to being admitted to candidacy for the Ph.D. degree, the student must demonstrate a competence in one foreign language and must successfully complete a series of essays and examinations covering the following: logic and formal philosophy; value theory; metaphysics, epistemology, and philosophy of science; and the history of philosophy. In these exercises students are expected to combine factual knowledge with critical understanding.

Work in a minor or related field, not necessarily confined to any one department, is encouraged but not required. A minor normally includes 6 units for the A.M. or the Ph.D. degree and may include more as a student's program requires or permits.

A student who meets the general requirements of the Graduate School may earn the A.M. degree in philosophy by passing an oral master's examination. This examination, which can be the defense of either a master's thesis or an alternative academic exercise approved by the department and the student's committee, is normally given in the student's fourth term of full-time registration. The examination can be given earlier in two special circumstances:

1. A student with a strong undergraduate background in philosophy who satisfies the department of his or her qualifications by submitting several samples of written work before beginning the program may be admitted to the master's program with the understanding that the master's examination can be given in the second or third term of full-time registration.

2. A student who combines the A.M. program in philosophy with another advanced degree program, such as the programs for the J.D., the M.D., or the Ph.D. in another field, will register as a full-time graduate student of philosophy for only two terms, the minimum registration that meets the general requirements of the Graduate School for the A.M. degree. These two terms of full-time registration need not be consecutive, and their position in the student's overall program is determined in individual cases. A student in a combined program will normally do some work in philosophy while registered in the student's primary program and do some work in the primary field while registered in philosophy. The master's examination can be given in the second term of full-time registration as a philosophy graduate student or in a later term when the student is registered in the primary program.

A student in the philosophy Ph.D. program who meets the general requirements of the Graduate School for the A.M. degree may earn this degree by passing the preliminary for the Ph.D. degree.

A reading knowledge of at least one foreign language, ancient or modern, is required for the Ph.D. degree. Students may not take their preliminary examinations until they have demonstrated this ability. More than one language may be required where this is judged appropriate to the research demanded by the candidate's dissertation.

Courses of Instruction

203S. Contemporary Ethical Theories
204S. Philosophy of Law
205S. Topics in Philosophy of History
206S. Responsibility
208S. Political Values
211S. Plato
217S. Aristotle
218S. Medieval Philosophy
219S. Late Medieval and Renaissance Philosophy
225S. British Empiricism
227S. Continental Rationalism
228S. Recent and Contemporary Philosophy
230S. The Meaning of Religious Language
231S. Kant's *Critique of Pure Reason*

233S. Methodology of the Empirical Sciences
234S. Problems in the Philosophy of Biology
235S. Hegel and Marx
250S. Topics in Formal Philosophy
251S. Epistemology
252S. Metaphysics
253S. Philosophy of Mind
254S. Philosophy of Religion
291S, 292S. Special Fields of Philosophy
311. Philosophy and Medicine
331, 332. Seminar in Special Fields of Philosophy

Courses Currently Unscheduled

202S. Aesthetics: The Philosophy of Art
232S. Recent Continental Philosophy

Physical Therapy

Professor Robert C. Bartlett, M.A. (New York Univ.), *Chairman*
Associate Professor Eleanor F. Branch, Ph.D. (Duke), *Director of Graduate Studies*

Associate Professors

Terry R. Malone, Ed.D. (Duke); Elia E. Villanueva, A.M. (Duke)

Assistant Professors

Pamela W. Duncan, M.A.C.T. (North Carolina at Chapel Hill); Janet L. Gwyer, Ph.D. (North Carolina at Chapel Hill); Grace C. Horton, B.S. (Albright)

Assistant Clinical Professor

Mary Ellen Riordan, M.S. (Wisconsin)

Clinical Associates

Daniel V. Dore, M.P.A. (Maine); Linda M. Lawrence, B.S. (SUNY at Buffalo)

The Department of Physical Therapy offers an entry level professional program leading to the M.S. degree. To be eligible for admission to the program, applicants must have obtained a baccalaureate degree and have a background in the basic sciences and social sciences, including course work in biology, chemistry, physics, and psychology.

The program is designed to provide for integration of classroom knowledge and clinical learning experiences essential for the competent practice of physical therapy. In view of this integrated curriculum, failure in a major course within a semester would prevent the student from continuing in the program. Major courses are all courses offered by the Department of Physical Therapy as well as required courses offered by the Department of Anatomy. A grade of *F* (or *noncredit* in the case of Physical Therapy 342, 343, and 344) in any of these courses will occasion withdrawal from the program. Program requirements also include a comprehensive examination, at the completion of the curriculum, and a research project. Further information may be obtained from the Director of Graduate Studies, Department of Physical Therapy, Box 3965, Duke University Medical Center, Durham, North Carolina 27710.

Courses of Instruction

- | | |
|--|---|
| 210. Independent Study | 334. Introductory Pathology |
| 301. Introduction to Scientific Inquiry | 335. Orthopedics |
| 302. Research | 336. Medical Sciences |
| 303. Research | 340. Special Topics in Physical Therapy |
| 313. Physical Agents | 342. Directed Clinical Experience in Physical Therapy I |
| 314. Electrotherapy and Electrodiagnosis | 343. Directed Clinical Experience in Physical Therapy II |
| 317. Kinesiology | 344. Directed Clinical Experience in Physical Therapy III |
| 318. Arthrology and Pathokinesiology | |
| 319. Introduction to Evaluation and Patient Care | |
| 320. Evaluation and Therapeutic Procedures I | |
| 321. Evaluation and Therapeutic Procedures II | |
| 322. Evaluation and Therapeutic Procedures III | |
| 332. Physical Therapy and Health Services: Administration and Issues | |
| 333. Pediatrics | |

Courses Currently Unscheduled

- | |
|---|
| 304. Seminar in Applied Neurophysiology |
| 324. Prosthetics and Orthotics |

Physics

Professor Lawrence E. Evans, Ph.D. (Johns Hopkins), *Chairman*

Professor Alfred T. Goshaw, Ph.D. (Wisconsin), *Director of Graduate Studies*

Professors

L. C. Biedenbarn, Jr., Ph.D. (Massachusetts Inst. of Tech.); Edward G. Bilpuch, Ph.D. (North Carolina at Chapel Hill); Frank C. DeLucia, Ph.D. (Duke); Lloyd Fortney, Ph.D. (Wisconsin); Moo-Young Han, Ph.D. (Rochester); Eric Herbst, Ph.D. (Harvard); John M. J. Madey, Ph.D. (Stanford); Johannes Horst Max Meyer, Ph.D. (Univ. of Geneva); N. Russell Roberson, Ph.D. (Johns Hopkins); Hugh G. Robinson, Ph.D. (Duke); William D. Walker, Ph.D., (Cornell); Richard L. Walter, Ph.D. (Notre Dame); Henry R. Weller, Ph.D. (Duke)

Associate Professors

Robert P. Behringer, Ph.D. (Duke); Richard G. Palmer, Ph.D. (Cambridge); John Thomas, Ph.D. (Massachusetts Inst. of Tech.)

Assistant Professors

Calvin R. Howell, Ph.D. (Duke); Seog Hwan Oh, Ph.D. (Massachusetts Inst. of Tech.); Stephen W. Teitsworth (Harvard)

Professors Emeriti

Henry A. Fairbank, Ph.D. (Yale); Harold W. Lewis, Ph.D. (Duke)

Adjunct Professors

Mikael Ciftan, Ph.D. (Duke); B. D. Guenther, Ph.D. (University of Missouri); Fearghus O'Foghludha, Ph.D. (National Univ. of Ireland); Herman R. Robl, Ph.D. (Univ. of Vienna); George Rogosa (Johns Hopkins); Michael A. Strosio (Yale)

The Department of Physics offers graduate work for students wishing to earn the A.M. or Ph.D. degree. In addition to a balanced program of basic graduate courses, the department offers specialized courses and seminars in several fields in which research is being done by faculty and staff.

With the help of faculty advisers, students select a course program to fit their needs, including work in a related field, usually mathematics or chemistry. Students are encouraged to begin research work early in their careers.

Courses of Instruction

211. Modern Physics
 214. Introduction to Solid-State Physics
 215. Introduction to Quantum Mechanics
 217S, 218S. Advanced Physics Laboratory and Seminar
 220. Electronics
 240. Computer Applications to Physical Measurement
 244. Nuclear and Particle Physics
 302. Advanced Mechanics
 303. Statistical Mechanics
 304. Advanced Topics in Statistical Mechanics*
 305. Introduction to Nuclear Physics
 308. Introduction to High-Energy Physics
 309. Solid-State Physics I
 316. Principles of Quantum Theory
 317. Intermediate Quantum Theory
 318-319. Electromagnetic Field Theory

331. Quantum Electronics*
 333. Electronic Properties of Submicron Solid State Devices
 335. Molecular Spectroscopy
 342. Theory of Elementary Particles*
 346. Topics in Theoretical Physics*
 351, 352. Seminar

Courses Currently Unscheduled

306. Low Temperature Physics
 310. Solid-State Physics II
 312. Phase Transitions and Critical Phenomena
 330. Nuclear Structure Theory
 341. Advanced Topics in Quantum Theory
 343. Nuclear Physics
 344. Advanced Nuclear Physics
 345. High-Energy Physics
 397, 398. Low Temperature and Solid-State Seminar

Physiology

Professor J. J. Blum, Ph.D. (Chicago), *James B. Duke Professor of Physiology and Acting Chair*
 Professor Sidney A. Simon, Ph.D. (Northwestern), *Director of Graduate Studies*

Professors

Irving T. Diamond, Ph.D. (Chicago); John W. Gutknecht, Ph.D. (North Carolina at Chapel Hill); Edward A. Johnson, M.D. (Univ. of Sheffield), *James B. Duke Professor of Physiology*; Frans S. Jöbsis, Ph.D. (Michigan); Melvyn Lieberman, Ph.D. (SUNY, Downstate Med. Ctr.); Lazaro J. Mandel, Ph.D. (Pennsylvania); John W. Moore, Ph.D. (Virginia); George M. Padilla, Ph.D. (California at Los Angeles); Robert Plonsey, Ph.D. (California at Berkeley); Jacqueline A. Reynolds, Ph.D. (Washington); George G. Somjen, M.D. (Univ. of New Zealand); Madison S. Spach, M.D. (Duke); Charles Tanford, Ph.D. (Princeton), *James B. Duke Professor of Physiology*

Associate Professors

Nels C. Anderson, Ph.D. (Purdue); Peter B. Bennett, Ph.D. (Univ. of Southampton); Celia Bonaventura, Ph.D. (Texas); Joseph Bonaventura, Ph.D. (Texas); Marc Caron, Ph.D. (Univ. of Miami); Robert P. Erickson, Ph.D. (Brown); Joseph C. Greenfield, M.D. (Emory); J. Mailen Kootsey, Ph.D. (Brown); Johannes A. Kylstra, M.D., Ph.D. (Univ. of Leiden); Thomas J. McManus, M.D. (Boston); Elliott Mills, Ph.D. (Columbia); David W. Schomberg, Ph.D. (Purdue); Steven R. Vigna, Ph.D. (University of Washington); Myron L. Wolbarsht, Ph.D. (Johns Hopkins)

Assistant Professors

Page A. W. Anderson, M.D. (Duke); Robert R. H. Anholt, Ph.D. (University of California—San Diego); Enrico Mario Camporesi, M.D. (Univ. of Milan); Vincent W. Dennis, M.D. (Georgetown); Stuart Handwerker, M.D. (Maryland); Andrew W. Wallace, M.D. (Duke); Andrew S. Wechsler, M.D. (SUNY, Downstate Med. Ctr); William E. Yarger, M.D. (Baylor)

Professor Emeritus

Knut Schmidt-Nielsen, Ph.D. (University of Copenhagen)

Adjunct Assistant Professors

Reginald D. Carter, Ph.D. (Bowman Gray)

Associate Medical Research Professors

Michael Lee Hines, Ph.D. (Chicago); Avis L. Sylvia, Ph.D. (North Carolina at Chapel Hill)

*Offered on demand.

The division of Physiology offers graduate work leading to the Ph.D. degree. Before undertaking this program a student should have a strong background in basic sciences including course work in mathematics, biology, physics, and chemistry through physical chemistry. Undergraduates with this background may have majors in any of the following areas: biology, chemistry, physics, mathematics, engineering, or computer sciences. There is no foreign language requirement.

Note: During the 1988-89 academic year portions of the physiology program may be reconstituted under new departments, currently under consideration, of cell biology and neurobiology. For further information, please contact the Director of Graduate Studies.

Courses of Instruction

200. Medical Physiology
202. Basic Neurophysiology
204. Introduction to Modern Physiology
205. Design and Analysis of Biological Experiments
208. Respiratory System in Health and Disease
210. Individual Study
217. Membrane Transport
225. Neurobiology of Sensory Systems
230. Molecular and Cellular Bases of Differentiation
272S. Physiology of the Central Nervous System
280. Student Seminar in Physiology
320. Gastrointestinal Physiology
321. Renal Physiology
350. Neurobiology of Diseases
370. Neurobiology I
372. Research in Physiology
390. Membrane Biology
401. Metabolic Physiology

417. Cellular Endocrinology
418. Reproductive Biology
424. Seminar in Reproductive Biology

Courses Currently Unscheduled

203. Introduction to Biophysics and Biophysical Chemistry
207. The Heart in Health and Disease
281. Teaching in Physiology
301. Oxygen and Physiological Function
302. Advanced Topics and Research Seminar in Smooth and Striated Muscle
362. Cardiac Muscle Physiology
383. Physiological Instrumentation
416. Biophysics of Excitable Membranes
419. Topics in Mathematical Physiology
420. Cellular Immunophysiology

Political Science

Professor Allan Kornberg, Ph.D. (Michigan), *Chairman*

Associate Professor Peter Lange, Ph.D. (Massachusetts Inst. of Tech.), *Director of Graduate Studies*

Professors

John Aldrich, Ph.D. (Rochester); William Louis Ascher, Ph.D. (Yale); James D. Barber, Ph.D. (Yale), *James B. Duke Professor of Political Science*; Robert Bates, Ph.D. (Massachusetts Institute of Technology), *Luce Professor of Political Economy*; Ralph Braibanti, Ph.D. (Syracuse), *James B. Duke Professor of Political Science*; Peter G. Fish, Ph.D. (Johns Hopkins); Ole R. Holsti, Ph.D. (Stanford), *George V. Allen Professor of Political Science*; Donald L. Horowitz, LL.M., Ph.D. (Harvard); Jerry F. Hough, Ph.D. (Harvard), *James B. Duke Professor of Political Science*; Richard H. Leach, Ph.D. (Princeton); David L. Paletz, Ph.D. (California at Los Angeles); David E. Price, B.D., Ph.D. (Yale); Thomas A. Spragens, Jr., Ph.D. (Duke)

Associate Professors

Albert Eldridge, Ph.D. (Kentucky); Sheridan Johns III, Ph.D. (Harvard); Margaret A. McKean, Ph.D. (California at Berkeley)

Assistant Professors

William Bianco, Ph.D. (Rochester); William James Booth, Ph.D. (Harvard); David T. Canon, Ph.D. (Minnesota); Robert M. Entman, Ph.D. (Yale); Michael A. Gillespie, Ph.D. (Chicago); Ruth Grant, Ph.D. (Chicago); Joseph M. Grieco, Ph.D. (Cornell); Herbert P. Kitschelt, Ph.D. (Bielefeld, West Germany); Timothy J. Lomperis, Ph.D. (Duke); Emerson M. S. Niu, Ph.D. (Univ. of Texas at Austin); Darryl Lamont Roberts, Ph.D. (Cornell)

Professors Emeriti

M. Margaret Ball, Ph.D. (Stanford); Fredrick N. Cleaveland, Ph.D. (Princeton); Robert Taylor Cole, Ph.D. (Harvard); Kazimierz Grzybowski, S.J.D. (Harvard); Hugh M. Hall, Jr., Ph.D. (Texas); John Hamilton Halliwell, Ph.D. (Princeton)

Adjunct Associate Professor

Jean F. O'Barr, Ph.D. (Northwestern)

The Department of Political Science offers graduate work leading to the A.M. and Ph.D. degrees. Before being admitted to candidacy for the Ph.D. degree, an applicant must have qualified for the A.M. degree.

Instruction is designed to prepare the student for teaching and research, for government service, and for other work related to public affairs. Before undertaking graduate study in political science, a student is ordinarily expected to have completed at least 12 semester hours of course work in political science. Instruction is currently offered in the following fields: American government and politics, comparative government and politics, political theory, and international relations.

The candidate for the degree of Doctor of Philosophy in political science must take at least sixteen courses in all, including twelve in the department, and demonstrate competence in at least two general fields of the discipline as well as in a third general field or in a specialized subfield or in a field external to the department. The candidate must also demonstrate a reading knowledge of two foreign languages or must demonstrate proficiency in one foreign language and in the use of statistics.

The terminal degree of Master of Arts, for those who do not intend to continue with doctoral studies, is awarded following successful completion of: (1) eight one-semester courses of 3 units each, at least half of which must be in political science; and (2) the A.M. thesis. In addition, candidates for the A.M. degree must demonstrate competence in one foreign language or in statistics.

Further details on the graduate program in political science, the departmental facilities, the staff, and available financial aid may be obtained from the Director of Graduate Studies, Department of Political Science.

Courses of Instruction

- | | |
|---|--|
| 201S. Problems in International Security | 235S. Comparative Development of Islam |
| 203S. Politics and the Media of Mass Communication | 236. Statistical Analysis |
| 204S. Ethics in Political Life | 237S. Comparative Public Policy |
| 207S. American Constitutional Interpretation | 240. American Political Behavior |
| 208S. Analyzing the News | 242S. Comparative Law and Policy: Ethnic Group Relations |
| 209. Problems in State Government and Politics | 243S. Political Applications of Game Theory |
| 211S. Current Problems and Issues in Japanese Politics | 245. Ethics and Policy Making |
| 212S. Domestic Structures and Foreign Policies of Advanced Democratic States | 246S. Political Hypocrisy and Idealism |
| 213S. Theories of International Political Economy | 248. The Politics of the Policy Process |
| 215S. Philosophical Bases of Political Economy and Society | 249. Comparative International Development and Technology Flow |
| 216S. Evolution of European Marxism | 251S. The American Presidency |
| 218S, 219S. Political Thought in the United States | 253S. Comparative Government and the Study of Latin America |
| 220S. Problems in International Politics | 255. Political Sociology |
| 221S. International Institutions and the World Political Economy | 256S. Arms Control and National Security Policy |
| 222. Seminar: Modern Political Classics | 259S. Low Intensity Conflict and the Lessons of Viet Nam |
| 223. Ancient Political Philosophy | 260. The Tradition of Political Inquiry |
| 224S. Modern Political Theory | 261. Politics and the Future |
| 225. Topics in Comparative Government and Politics: Western Europe | 262S. International Communism |
| 226S. Theories of International Relations | 263S. Methods of Political Science |
| 227. International Law | 267S. Policy Making in International Organizations |
| 228S. Nineteenth- and Twentieth-Century Political Philosophy | 270S. Fundamentals of Political Economy |
| 229S. Contemporary Theory of Liberal Democracy | 275. The American Party System |
| 230. Introduction to Positive Political Theory | 277. Comparative Party Politics |
| 231. Crisis, Choice, and Change in Advanced Democratic States | 279. Political Protest and Collective Mobilization |
| 232. Political Economy: Theory and Applications | 282S. Canada |
| 233S. Quantitative Political Analysis II | 283S. Congressional Policy Making |
| 234S. Political Economy of Development: Theories of Change in the Third World | 284S. Public Policy Process in Developing Countries |
| | 286S. Judicial Administration |
| | 293. Federalism |
| | 299. Advanced Topics in Government and Politics |
| | 303. Seminar on Statistics |

305. Seminar in U.S. Foreign Policy
 306. Political Development of the U.S. Fourth Circuit Courts
 308. Individual Research
 309. Seminar in International Relations
 321. Seminar in Political Theory
 322. Topics in Early Modern Political Thought
 324. Seminar in Comparative Politics (A)
 325. Seminar in Comparative Politics (B)
 326. Research Seminar in Comparative Government and Politics
 327. Comparative Political Behavior
 332. Seminar on Political Economy: Micro Level

333. Seminar on Political Economy: Macro Level
 340. Seminar in American Politics and Institutions
 381. Research Seminar in Latin American Government and Politics
 397, 398. Selected Topics in Government and Politics

Courses Currently Unscheduled

214S. The Politics of Scarcity
 280S. Comparative Government and Politics: Sub-Saharan Africa
 360. Seminar in Government and Politics in the Soviet Union

Related Course Work in the School of Law

There may be graduate credit for course work completed in the Duke University School of Law, under regulations referred to in the larger Graduate School bulletin (see the section on academic regulations in the chapter on "Regulations" in that bulletin).

Psychology

Professor Robert P. Erickson, Ph.D. (Brown), *Acting Chairman*

Professor Lynn Hasher, Ph.D. (California at Berkeley), *Director of Graduate Studies*

Professors

Irving E. Alexander, Ph.D. (Princeton); Robert C. Carson, Ph.D. (Northwestern); John D. Coie, Ph.D. (California at Berkeley); Philip R. Costanzo, Ph.D. (Florida); Irving T. Diamond, Ph.D. (Chicago), *James B. Duke Professor of Psychology*; Carl J. Erickson, Ph.D. (Rutgers); Warren G. Hall, Ph.D. (Johns Hopkins); Martin Lakin, Ph.D. (Chicago); Gregory R. Lockhead, Ph.D. (Johns Hopkins); David C. Rubin, Ph.D. (Harvard); John E. R. Staddon, Ph.D. (Harvard), *James B. Duke Professor of Psychology*; Michael A. Wallach, Ph.D. (Harvard); Cliff W. Wing, Jr., Ph.D. (Tulane)

Associate Professors

Ruth S. Day, Ph.D. (Stanford); Carol O. Eckerman, Ph.D. (Columbia); Peter C. Holland, Ph.D. (Yale); Susan Roth, Ph.D. (Northwestern)

Assistant Professors

Irwin Kremen, Ph.D. (Harvard); Martha Putallaz, Ph.D. (Illinois)

Professors Emeriti

Lloyd J. Borstelmann, Ph.D. (California at Berkeley); Gregory A. Kimble, Ph.D. (Iowa); Harold Schiffman, Ph.D. (Princeton)

Adjunct Professors

H. Keith H. Brodie, M.D. (Columbia); Herbert F. Crovitz, Ph.D. (Duke); Linda K. George, Ph.D. (Duke); William C. Hall, Ph.D. (Duke); John Lochman, Ph.D. (Univ. of Connecticut); George L. Maddox, Ph.D. (Michigan State); Susan S. Schiffman, Ph.D. (Duke); Robert J. Thompson, Jr., Ph.D. (North Dakota); Lise Wallach, Ph.D. (Kansas); Jay M. Weiss, Ph.D. (Yale)

Adjunct Associate Professors

John H. Casseday, Ph.D. (Indiana); David Goldstein, Ph.D. (Syracuse); Gail Marsh, Ph.D. (Iowa); Kenneth I. Spenner, Ph.D. (Wisconsin at Madison)

The department offers graduate work leading to the Ph.D. degree. The areas of concentration are biological, cognitive and sensory sciences, personality, developmental, and clinical. A brochure is available from the Director of Graduate Studies which describes the program in more detail and gives information on financial assistance, facilities, and current research activities. The Psychology Department has no foreign language requirement.

Courses of Instruction

200. Advanced Neuroscience I
 201. Advanced Neuroscience II
 203S. Sensation and Perception
 204S. Great Ideas in Psychology
 206S. Stress and Health
 210S. Cognition
 212S. Human Memory

214S. Development of Social Interaction
 215S. Cognitive Development
 217S. Advanced Social Psychology
 219S. Physiological Foundations of Psychology
 220S. Psycholinguistics
 231S. Parent-Child Interaction
 234S. Advanced Personality

- 238S. Psychophysiology
- 255S. Perinatal Behavior
- 261S. Advanced Modern Learning Theory
- 266S. Comparative Neurobiology
- 267S. Brain Mechanisms of Behavior
- 270S. A-R, U-Z. Selected Problems
- 273S. Statistical Principles in Experimental Design
- 285S. Developmental Psychobiology
- 286S. Biological Basis of Hearing
- 289S. Psychology of Prevention
- 301. Group Psychotherapy and Group Influence Processes
- 302. Personality Theory
- 305. Psychopathology
- 307. Introduction to Theories and Methods of Mainstream Psychotherapies
- 309. Seminar in Learning
- 318. Measurement and Methods
- 329-330. Proseminar in Psychology
- 335-336. Personality Assessment
- 339. Ethics for Psychotherapists
- 343-344. Clinical Practicum
- 348. Psychotherapy with Children and Families
- 349-350. Practicum in Psychological Research
- 351. Developmental Psychopathology
- 352. Child Assessment
- 398. Graded Research
- 399. Special Readings in Psychology

Courses Currently Unscheduled

- 230S. Social Behavior of Animals
- 310. Seminar in Perception
- 323, 324. Seminar in Community Psychology
- 337. Seminar in Sensory Discrimination
- 353. Research Practicum in Prevention

Public Policy Studies

Professor Philip J. Cook, Ph.D. (California at Berkeley), *Director*

Professor Helen F. Ladd, Ph.D. (Harvard), *Director of Graduate Studies*

Professors

William Louis Ascher, Ph.D. (Yale); James D. Barber, Ph.D. (Yale); Robert D. Behn, Ph.D. (Harvard); Charles T. Clotfelter, Ph.D. (Harvard); David M. Eddy, M.D. (Virginia), Ph.D. (Stanford); Joel L. Fleishman, LL.M. (Yale); S. Malcolm Gillis, Ph.D. (Illinois); Donald L. Horowitz, LL.M., Ph.D. (Harvard); Jerry F. Hough, Ph.D. (Harvard); Bruce R. Kuniholm, Ph.D. (Duke); Wesley A. Magat, Ph.D. (Northwestern); George W. Pearsall, Sc.D. (Massachusetts Inst. of Tech.); David E. Price, Ph.D. (Yale)

Associate Professors

Joseph Lipscomb, Jr., Ph.D. (Vanderbilt); John B. McConahay, Ph.D. (California at Los Angeles); Carol B. Stack, Ph.D. (Illinois)

Assistant Professors

Daniel Durning, Ph.D. (California at Berkeley); Robert M. Entman, Ph.D. (Yale)

Professors of the Practice

Henry Geller, J.D. (Northwestern); Richard A. Stubbing, M.B.A. (Harvard), Ph.D. (Notre Dame); Duncan Yaggy, Ph.D. (Brandeis)

Lecturer

Bruce L. Payne, M.A. (Yale)

The graduate program in public policy studies is offered through the Institute of Policy Sciences and Public Affairs. The objective of the program is to prepare students for jobs, particularly in the public sector, which require analytical skills and a practical understanding of the processes by which policy is made and implemented.

The A.M. degree requires two academic years and a summer internship. The first year is devoted to core courses in policy analysis, including sequences in quantitative methods, economics, political analysis, and ethics. The summer internship is arranged with a federal, state, or local agency. The second-year curriculum includes course work in public management and macroeconomics, a concentration in a substantive policy area, and a masters "memo" to be researched and written on a problem of current policy concern.

Students who are concurrently enrolled in a Ph.D. program or a professional degree program (M.D., J.D., M.B.A., M.H.A., etc.) or who have already obtained such a degree, can apply for an abbreviated version of the A.M. program. Such students are excused from most second-year requirements, so ordinarily the A.M. in public policy can be completed in one additional year. Students usually apply for a joint degree program simultaneously with their applications to the graduate departments or professional schools, or during their first or second year of advanced study.

The institute does not award a Ph.D.

More information concerning the A.M. programs can be obtained by writing the Director of Graduate Studies.

Courses of Instruction

204S. Ethics in Political Life
217. Microeconomics and Public Policy Making
218. Macroeconomic Policy
219. The Politics of the Policy Process
221. Decision Analysis for Public Policy Makers
222. Data Analysis for Public Policy Makers
223. Ethics and Policy Making
231. Quantitative Evaluation Methods
232. Microeconomics: Policy Applications
236, 237. Public Management I and II: Managing Public Agencies
238. Public Budgeting and Financial Management
240S. Analyzing the News
241. Reporting the American People
245S. Leadership Tutorial
250S. Policy, Philanthropy, and the Arts
254. Transportation Planning and Policy Analysis
257. United States Policy in the Middle East
264S. Research Seminar: Topics in Public Policy I
267S. Policy Making in International Organizations

268. Federal Tax Policy
270S. Humanistic Perspectives on Public Policy
272. Resource Economics and Policy
278. Human Service Bureaucracies
283S. Congressional Policy Making
284S. Public Policy Process in Developing Countries
286S. Economic Policy Making in Developing Countries
303. Public Policy Workshop I
304.01. Public Policy Workshop II
305.01. Public Policy Workshop III
387. Research Tutorial in Public Policy
388. Research Tutorial in Public Policy
399. Special Readings in Public Policy Studies

Courses Currently Unscheduled

256. The Economics of Health Care
270S. Humanistic Perspectives on Public Policy

Religion

Professor Hans Hillerbrand, *Chairman*

Professor Stanley Hauerwas, Ph.D. (Yale), *Director of Graduate Studies*

Professors

Dennis M. Campbell, Ph.D. (Duke); Elizabeth A. Clark, Ph.D. (Columbia); James L. Crenshaw, Ph.D. (Vanderbilt); Frederick Herzog, Th.D. (Princeton); Wesley A. Kort, Ph.D. (Chicago); Thomas A. Langford, Ph.D. (Duke); Bruce B. Lawrence, Ph.D. (Yale); C. Eric Lincoln, Ph.D. (Boston); George Marsden, Ph.D. (Yale); Eric M. Meyers, Ph.D. (Harvard); Robert T. Osborn, Ph.D. (Drew); D. Moody Smith, Ph.D. (Yale); Harmon L. Smith, Ph.D. (Duke); David C. Steinmetz, Th.D. (Harvard); Dan O. Via, Jr., Ph.D. (Duke); Geoffrey Wainwright, Dr. Theol. (Geneva); Orval S. Wintermute, Ph.D. (Johns Hopkins)

Associate Professors

Lloyd R. Bailey, Ph.D. (Hebrew Union Coll., Jerusalem); Roger J. Corless, Ph.D. (Wisconsin); Carol L. Meyers, Ph.D. (Brandeis); Harry B. Partin, Ph.D. (Chicago); Melvin K. H. Peters, Ph.D. (Toronto); Kenneth Surin, Ph.D. (U. of Birmingham, England).

Assistant Professors

Teresa Berger, Ph.D. (Ruprecht Karl Universität); Ted A. Campbell, Ph.D. (Southern Methodist); Mary Fulkerson, Ph.D. (Vanderbilt); Susan Keefe, Ph.D. (Toronto); Dale Martin, Ph.D. (Yale); Sandra P. Robinson, Ph.D. (Chicago); William C. Turner, Ph.D. (Duke)

Professors Emeriti

William W. Beach, Ph.D. (Yale); David G. Bradley, Ph.D. (Yale); Stuart C. Henry, Ph.D. (Duke); Creighton Lacy, Ph.D. (Yale); Roland E. Murphy, S.T.D. (Catholic Univ. of America); William H. Poteat, Ph.D. (Duke); James Ligon Price, Jr., Ph.D. (Cambridge); Franklin W. Young, Ph.D. (Duke)

Research Professor

Russell Richey, Ph.D. (Princeton)

The Department of Religion offers graduate work leading to the A.M. and Ph.D. degrees. Students may major in one of seven fields: (1) Hebrew Bible and Semitic studies, (2) New Testament and Christian origins, (3) history of Christianity, (4) Christian theology and ethics, (5) history of Judaism, (6) history of religions, and (7) religion and culture. They will be expected to take courses which will contribute to an adequate understanding of their chosen fields of specialization and will be required to take two written preliminary examinations within their field of concentration.

In addition to course work in their major field, students will take such other courses in cognate fields as will contribute to the enrichment of their major studies and will be required to take one written preliminary examination in a single cognate area within the

department. A minor requirement may be fulfilled by work in a cognate department, such as classical studies, history, philosophy, political science, or sociology, and will constitute the outside minor and material for a fourth written preliminary examination. There is, in addition, an oral examination conducted by the student's committee immediately subsequent to the written examinations.

The program of doctoral studies presumes a foundation in the academic study of religion. Students applying for graduate work in religion directly from an undergraduate program should have had a strong undergraduate major in religion, and will be accepted for the M.A.-Ph.D. program which presumes they will complete the M.A. as part of their progress toward the Ph.D.

The graduate program also offers an A.M. degree that is not linked to a specific Ph.D. field. Such study is intended to encourage individuals to pursue a variety of interests irrespective of whether they desire further graduate study. An A.M. concentration may be in any of the seven Ph.D. fields or in an individually designed program of study (such as Islamic studies or religion and the social sciences).

Courses of Instruction

- | | |
|--|---|
| <p>200. Person and Work of Christ
 204. Origen
 206. Christian Mysticism in the Middle Ages
 207, 208. Intermediate Biblical Hebrew
 209. Old Testament Theology
 211. Authority in Theology
 212. Studies in American Methodism
 213. Christian Ethics in America
 214. Feminist Theology
 215S. Theological Ethics
 217. Islam in India
 218. Religion in Japan
 219. Augustine
 220. Rabbinic Hebrew
 221. Readings in Hebrew Biblical Commentaries
 222. John Among the Gospels
 223A-G. Exegesis of the Hebrew Old Testament
 225. Living Issues in New Testament Theology
 226A-F. Exegesis of the Greek New Testament I
 227A-D. Exegesis of the Greek New Testament II
 228. Twentieth-Century Continental Theology
 230S. The Meaning of Religious Language
 231S. Seminar in Religion and Contemporary Thought
 232S. Religion and Literature
 233. Modern Narratives and Religious Meanings
 234. Early Christian Asceticism
 235. Heresy: Theological and Social Dimensions of Early Christian Dissent
 236. Luther and the Reformation in Germany
 237. History of the Ancient Near East
 238. Jewish Responses to Christianity
 239. Introduction to Middle Egyptian I
 240. Introduction to Middle Egyptian II
 242. Life After Death in Semitic Thought
 243. Archaeology of Palestine in Biblical Times
 244. The Archaeology of Palestine in Hellenistic-Roman Times
 245. Ethics in World Religions
 246. Problems in Historical Theology
 248. The Theology of Karl Barth
 249. The Lord's Prayer
 256. John Wesley in Controversial and Ecumenical Theology
 257. New Testament Ethics
 258. Coptic</p> | <p>259. Icon Theology
 260. Life and Thought of the Wesleys
 262. Marxist Ideology and Christian Faith
 263. Third World Theology
 264. The Sociology of the Black Church
 265. The Religions of the West Africa Diaspora
 266. Ethics and Health Care
 269. Feminist Theory and the Humanities
 270. American Evangelicalism and Fundamentalism
 273. Continental and British Roots of Evangelicalism
 279. Understandings of the Resurrection in Contemporary Thought
 280. The History of Religions
 281. Phenomenology and Religion
 282. Myth and Ritual
 283. Islam and Modernism
 284. The Religion and History of Islam
 285. Introduction to the History of Religions
 287. The Scriptures of Asia
 288. Buddhist Thought and Practice
 289. Theology and Contemporary Secular Understandings of Human Nature
 290. Current Problems in Christian Social Ethics
 291. Historical Forms of Protestant Ethics
 292. Happiness, Virtue, and Friendship
 293. Religious Issues in American History
 294. Christianity and the State
 295. Religion in the American South
 297. Philosophical and Theological Discourses on Modernity
 300. Systematic Theology: The Doctrine of the Trinity
 302. Studies in the Intertestamental Literature
 304. Aramaic
 304A. Targumic Aramaic
 305. The Septuagint
 306. Language and Literature of the Dead Sea Scrolls
 307. Syriac
 308. Greek Patristic Texts
 309. Hermeneutics
 310. Readings in Judaism
 311. Pharasaic Judaism in the First Century
 315-316. Seminar: History of Religions
 318. Seminar in the Greek Fathers
 322. Nineteenth-Century European Theology</p> |
|--|---|

323A. Comparative Semitic I
 323B. Comparative Semitic II
 324. Readings in the History of Religion
 325. Philosophical Theology I
 326. Philosophical Theology II
 329. Readings in Theology and Language
 330. Contemporary Christologies
 331. Eschatology
 332. System in Theology
 334. Theology and Reform in the Later Middle Ages
 337. Theology of St. Thomas Aquinas
 338. Calvin and the Reformed Tradition
 340-341. Seminar in the New Testament
 342. American Religious Biography
 343. Readings in Ancient Near Eastern Wisdom Literature
 346. Practical Reason and Personal Identity: Explorations in Narrative
 350-351. Old Testament Seminar
 352. Seminar in Christian Theology
 353. Seminar on Text Criticism
 360. Special Problems in Religion and Culture
 362. Readings in Old Testament and Semitic Studies
 363. Readings in New Testament and Christian Origins
 364. Readings in History of Christianity
 365. Readings in Christian Theology and Ethics
 366. Readings in History of Religions
 367. Readings in Religion and Culture
 373-374. Elementary Akkadian
 380. Existentialist Thought
 383. Moral Theology in the Twentieth Century
 384. Religious Dissent in American Culture

385. Religion in American Literature
 386. Christianity in Dialogue with Other Faiths
 387. Ethical Method
 389. Christian Ethics and Contemporary Culture
 395. Christian Thought in Colonial America
 396. Liberal Traditions in American Theology

Courses Currently Unscheduled

221. Readings in Hebrew Biblical Commentaries
 241. Problems in Reformation Theology
 242. Life after Death in Semitic Thought
 247. Readings in Latin Theological Literature
 251. Counter-Reformation and Development of Catholic Dogma
 252. Nineteenth- and Twentieth-Century Roman Catholic Theology
 301. Seminar in Contemporary Christian Ethics
 311. Pharisaic Judaism in the First Century
 312. Pauline Theology
 313. The Apostolic Fathers
 314. Judaism and Christianity in the New Testament
 317. Seminar in the Greek Apologists
 319. The Gospel According to St. Matthew in Recent Research
 320. Theology, Power, and Justice
 324. Readings in the History of Religion
 327. Philosophical Method in Religious Studies
 328. Twentieth-Century European Theology
 335. The English Church in the Eighteenth Century
 339. The Radical Reformation
 344. Zwingli and the Origins of Reformed Theology
 397. Contemporary American Theology
 398. Colloquium on the Teaching of Religion
 401. Colloquium in Biblical Studies

Romance Languages

Professor John M. Fein, Ph.D. (Harvard), *Chairman*

Professor Gustavo Pérez-Firmat, Ph.D. (Michigan), *Director of Graduate Studies*

Professors

Miguel Garci-Gómez, Ph.D. (Catholic Univ.), Fredric R. Jameson, Ph.D. (Yale); Rafael Osuna, Ph.D. (Brown); Philip Stewart, Ph.D. (Yale); Marcel Tetel, Ph.D. (Wisconsin); Jean-Jacques Thomas, Doctorat de 3e Cycle (Univ. of Paris); Valentin Mudimbe, Ph.D. (Louvain); Bruce W. Wardropper, Ph.D. (Pennsylvania), William H. Wannamaker *Professor of Romance Languages*

Associate Professors

Ernesto Caserta, Ph.D. (Harvard); Alexander Hull, Ph.D. (Washington); Alice Yaeger Kaplan, Ph.D. (Yale); Linda Orr, Ph.D. (Yale)

Assistant Professor

David F. Bell III, Ph.D. (Johns Hopkins); Valeria Finucci, Ph.D. (Illinois); Kathleen A. Ross, Ph.D. (Yale); Stephanie Sieburth, Ph.D. (Princeton)

Professors Emeriti

Thomas Cordle, Ph.D. (Yale); Wallace Fowlie, Ph.D. (Yale)

Visiting Professor

Ariel Dorfman, M.A. (University of California at Berkeley)

Lecturer and Director of Language Instruction

Claire Tufts, Ph.D. (North Carolina)

The Department of Romance Languages offers graduate work leading to the A.M. and Ph.D. degrees in French and Spanish. Requirements for the A.M. may be completed by submission of a thesis or by passing a comprehensive examination in the major field. Related work for the A.M. and Ph.D. degrees is required in a second Romance language or in any one or two of a number of other subject areas. A reading knowledge of one foreign language which is outside the major language is required.

In order to undertake graduate study in Romance languages, the entering student should have credit for at least 18 semester hours (or equivalent) above the intermediate level in the major language.

French

Courses of Instruction

- 200S. Seminar in French Literature
- 210. The Structure of French
- 211. History of the French Language
- 223. Semiotics for Literature
- 248. French Literature of the Seventeenth Century
- 251, 252. Literature of the Eighteenth Century
- 255. French Preromantic and Romantic Poetry
- 256. Modern Literature and History
- 257. Problems of Identity in the Nineteenth-Century French Novel
- 258. The Narrative of Social Crisis
- 261. French Symbolism
- 263. Contemporary French Theater
- 264. Contemporary French Poetry
- 265. French Literature of the Early Twentieth Century
- 266. French Literature of the Mid-Twentieth Century
- 267. Contemporary French Novel
- 290S. Studies in a Contemporary Figure
- 325. French Prose of the Sixteenth Century
- 326. Topics in Renaissance Poetry
- 391, 392. French Seminar
- Graduate Reading Course

Italian

Courses of Instruction

- 283. Italian Novel of the Novecento
- 284. Dante
- 285. Dante

Spanish

Courses of Instruction

- 200S. Seminar in Spanish Literature
- 210. History of the Spanish Language
- 241. Colonial Prose of Spanish America
- 242. Colonial Poetry and Theater of Spanish America
- 245. Modern Spanish-American Poetry
- 246. Modern Spanish-American Fiction
- 248. Studies in Spanish-American Literature
- 251. The Origins of Spanish Prose Fiction
- 253. Cervantes
- 254. Drama of the Golden Age
- 258S. Spanish Lyric Poetry before 1700
- 262. The Romantic Movement
- 275. Modern Spanish Poetry
- 276. Modern Spanish Drama
- 277. Modern Spanish Novel
- 391, 392. Hispanic Seminar

Romance Languages

Courses of Instruction

- 218. The Teaching of Romance Languages
- 310. Computers for the Humanities

Slavic Languages and Literatures

Professor Magnus J. Krynski, Ph.D. (Columbia), *Chairman*

Associate Professor Emeritus

Bronislas de Leval Jezierski, Ph.D. (Harvard)

The Department of Slavic Languages and Literatures offers graduate courses in Russian language and literature and limited training in the language and literature of Poland.

Students should have sufficient preparation in the Russian language to enable them to read Russian classical literature in the original. Any presently unscheduled course will be taught in any semester upon request.

Courses of Instruction

- 201, 202. Russian Novel of the Nineteenth Century
- 225. Tolstoy
- 232. Dostoevsky

Courses Currently Unscheduled

- 207. Soviet Literature and Culture
- 230. Chekhov

Sociology

Professor Kenneth C. Land, Ph.D. (Texas), *Chairman*

Professor Joel Smith, Ph.D. (Northwestern), *Director of Graduate Studies*

Professors

Kurt W. Back, Ph.D. (Massachusetts Inst. of Tech.), *James B. Duke Professor of Sociology*; Linda K. George, Ph.D. (Duke); Alan C. Kerckhoff, Ph.D. (Wisconsin); George L. Maddox, Jr., Ph.D. (Michigan State); George C. Myers, Ph.D. (Washington); Erdman B. Palmore, Ph.D. (Columbia); Ida H. Simpson, Ph.D. (North Carolina at Chapel Hill); Edward A. Tiryakian, Ph.D. (Harvard)

Associate Professors

Gary Gereffi, Ph.D. (Yale); Angela O'Rand, Ph.D. (Temple); Kenneth I. Spenner, Ph.D. (Wisconsin); John Wilson, D.Phil. (Oxford)

Professors Emeriti

John C. McKinney, Ph.D. (Michigan State); Jack J. Preiss, Ph.D. (Michigan State)

Research Professor

Kenneth G. Manton, Ph.D. (Duke)

The department offers graduate work leading to the A.M. and Ph.D. degrees in sociology. Students beginning work toward an advanced degree should have completed a minimum of 12 semester hours of acceptable courses in sociology and an additional 12 semester hours in related work (e.g., other social sciences, statistics, computer science, philosophy, mathematics). Accepted applicants who have not had such preparation may be required to take work beyond the usual requirements. Applicants for admission are required to take the verbal and quantitative aptitude tests of the Graduate Record Examination.

The Ph.D. program requires the student to take three core courses (Sociology 206, 207, 208) and a major and a minor specialization. Specializations (with the associated proseminar indicated in parentheses) include Life Course and Aging Studies (Sociology 221); Comparative and Historical Sociology (Sociology 222); Criminology, Criminal Justice, and the Sociology of Law (Sociology 223); Demography, Ecology, and Social Epidemiology (Sociology 224); and Organizations, Markets, and Work (Sociology 225). Requirements for major specialties vary between five and seven courses. Minor specialties require three or more courses. Including the two courses outside the department required by the Graduate School, a student entering with only an undergraduate degree and adequate course preparation would need to take a minimum of from thirteen to fifteen courses to satisfy degree requirements. Up to fifteen credits, the equivalent of five courses, may be transferred for graduate work taken elsewhere, with requirements adjusted as appropriate.

There is a qualifying procedure after three semesters, or the equivalent, to determine whether the student can proceed to the preliminary examination. The latter consists of a four-hour written examination covering the student's chosen major and minor specializations and a two-hour oral examination covering these areas plus the core material. Further details concerning the general departmental program, the specialties and their requirements, departmental facilities, the faculty, ongoing research, and stipends available may be obtained from the Director of Graduate Studies.

Courses of Instruction

200S. Exile and Frontiers: Finding a Definition of Home for the Twentieth Century
206. Sociological Theory
207. Social Statistics I: Basic Concepts and Methods
208. Survey Research Methods
211A-E. Proseminars in Sociological Theory
212. Social Statistics II: Linear Models, Path Analysis, and Structural Equation Systems
213. Social Statistics III: Discrete Multivariate Models
214. Comparative and Historical Methods
215. Basic Demographic Methods and Materials
216. Advanced Methods of Demographic Analysis
217A-F. Proseminars in Social Statistics and Research Methods
221A-D. Proseminars in Aging and Life Course Analysis

222A-D. Proseminars in Comparative and Historical Sociology
223A-E. Proseminars in Criminology, Criminal Justice, and the Sociology of Law
224A-E. Proseminars in Demography, Human Ecology, and Social Epidemiology
225A-E. Proseminars in Organization, Markets, and Work
226A-H. Proseminars in Social Institutions and Processes
234S. Political Economy of Development: Theories of Change in the Third World
255. Political Sociology
282S. Canada
298S, 299S. Seminar in Selected Topics
392. Individual Research in Sociology

The University Program in Toxicology

Professor of Pathology Doyle G. Graham, M.D., Ph.D. (Duke), *Director*

Professor Mohamed B. Abou-Donia, Ph.D. (California at Berkeley), *Deputy Director*

James B. Duke Professor of Biochemistry Irwin Fridovich, Ph.D. (Duke), *Deputy Director*

Associate Professor Curtis J. Richardson, Ph.D. (Tennessee), *Deputy Director*

The University Program in Toxicology seeks to produce individuals with sound training in the scientific basis for toxicological research who will advance the science of this discipline. After broad general courses in epidemiology and statistics, pathology, and mammalian toxicology, students will be trained in one of three tracks: (1) as generalist toxicologists, with broad training in the principles and concepts of toxicology and the design of protocols for toxicological assessments; (2) as specialist toxicologists in those areas of toxicology research in which faculty members are currently productive: pulmonary toxicology, neurotoxicology, immunotoxicology, genetic toxicology (carcinogenesis), and biochemical toxicology; or (3) as ecotoxicologists with broad training in principles and concepts of both toxicology and ecology as they relate to the release, transport, exposure, accumulation, and effects of toxicants in the ecosystems.

The toxicology program faculty is comprised of members from the Departments of Biochemistry, Chemistry, Microbiology and Immunology, Pathology, Pharmacology, Physiology, Zoology, the School of Forestry and Environmental Studies, the Duke University Marine Laboratory, and several departments in the School of Medicine.

Students seeking the Ph.D. in one of the participating Graduate School departments may make initial application to either the program or one of the departments. All who apply directly to the program will be considered for admission by the program and the department of the student's choice. Students who apply initially for graduate study in one of the departments may also be nominated by that department for admission to the program. It is expected that most students will have a strong undergraduate preparation in mathematics and the physical and biological sciences with demonstrated excellence of performance as judged by grades in course work and letters of recommendation from former instructors.

Each student in the program will take a series of courses in toxicology as well as courses specified by his or her department. A student will be expected to choose a dissertation adviser in his or her department by the end of the first two semesters in the program, and will normally be expected to begin dissertation research during the third semester in residence. Upon satisfactorily completing all degree requirements in the program and in the department, students will be jointly recommended for the Ph.D. degree.

Further information may be obtained from the Director of the toxicology program (Department of Pathology).

Women's Studies

Associate Professor Jean F. O'Barr, (Northwestern), *Director*

Associate Professor Carol Meyers, (Brandeis), *Associate Director*

The Women's Studies Program provides a focal point within the university for the study of gender. Students enrolled in any of the university's departments and professional schools may participate in the program through enrollment in the courses listed below, through specialized study in independent research with any of the fifty-four faculty members associated with the program, and through pursuing an M.A. or Ph.D. thesis topic in feminist theory. Students considering a concentration in women's studies are encouraged to consult the Director for assistance in tailoring a program of study suited to their individual professional needs. A graduate certificate in women's studies is offered to those doing IDC 211 and at least two other courses on women at the graduate level.

SIGNS: Journal of Women in Culture and Society is edited at Duke. Internships and work-study positions form an important part of the graduate education of students interested in feminist scholarship.

Courses of Instruction

Interdisciplinary Course 211. History of Feminist Thought
Interdisciplinary Course 283. Feminist Theory and the Humanities
Interdisciplinary Course 284. Feminist Theory and the Social Sciences

Courses on Women Offered by Departments

Department of Anthropology

215. The Anthropology of Women
251S. American Marriage: A Cultural Approach
272. Marxism and Feminism

Comparative Literature

282. Structuralism, Post-Structuralism and After
289. Topics in Feminist Theory

English

269. American Women Writers
287. Feminist Literary Theory
288. The Western American Culture
321. Gender and Power in Renaissance Texts
381. Going Primitive/Reimagining Modernism

French

290. Studies in a Contemporary Figure: Wittig

History

227, 228. Recent United States History: Major Political and Social Movements
351.40. Colloquium in Women's History

Literature

302. New Criticism in Literary Theory

Political Science

200A. Contemporary American Feminism

Public Policy Studies

264. Women and Justice
278. Human Service Bureaucracies

Religion

Christian Theology 214. Feminist Theology
Religion 234. Early Christian Asceticism

Romance Languages

391. French Prose of the 16th Century: Marguerite de Navaree

Sociology

277. Patterns of Personal Development

Zoology

Professor Nicholas W. Gillham, Ph.D. (Harvard), *Chairman*

Associate Professor Mark D. Rausher, Ph.D. (Cornell), *Director of Graduate Studies*

Professors

John D. Costlow, Jr., Ph.D. (Duke); Donald J. Fluke, Ph.D. (Yale); Peter H. Klopfer, Ph.D. (Yale); Daniel A. Livingstone, Ph.D. (Yale), *James B. Duke Professor of Zoology*; David R. McClay, Ph.D. (North Carolina at Chapel Hill); R. Bruce Nicklas, Ph.D. (Columbia); H. Frederik Nijhout, Ph.D. (Harvard); John E. R. Staddon, Ph.D. (Harvard), *James B. Duke Professor of Zoology*; Vance A. Tucker, Ph.D. (California at Los Angeles); Steven Vogel, Ph.D. (Harvard); Stephen A. Wainwright, Ph.D. (California at Berkeley), *James B. Duke Professor of Zoology*; Calvin L. Ward, Ph.D. (Texas); Henry M. Wilbur, Ph.D. (Michigan)

Associate Professors

Richard B. Forward, Jr., Ph.D. (California at Santa Barbara); Cathy C. Laurie, Ph.D. (Minnesota); John G. Lundberg, Ph.D. (Michigan); Joan V. Ruderman, Ph.D. (MIT); John P. Sutherland, Ph.D. (California at Berkeley); Marcy K. Uyenoyama, Ph.D. (Stanford)

Assistant Professor

Virginia Louise Roth, Ph.D. (Yale)

Professors Emeriti

Joseph R. Bailey, Ph.D. (Michigan); Cazlyn G. Bookhout, Ph.D. (Duke); John R. Gregg, Ph.D. (Princeton); Knut Schmidt-Nielsen, Dr.Phil. (University of Copenhagen); Karl M. Wilbur, Ph.D. (University of Pennsylvania)

Adjunct Professor

Klaus Schmidt-Koenig, Ph.D. (Univ. of Freiburg)

Lecturer

Mary M. Nijhout, Ph.D. (Harvard)

The Department of Zoology manages a variety of programs tailored to individual needs of students seeking the Ph.D. degree. The A.M. degree may be taken by students en route to the Ph.D., or by those who leave the doctoral program. Ordinarily, only students seeking the doctorate are admitted to the department.

In general, students entering the department will be equipped to pursue advanced degrees if they have completed an undergraduate major in biology along with some formal training in college-level chemistry, mathematics, physics, and foreign languages.

Nevertheless, in recognition and support of the modern trend toward interdisciplinary research, the department is prepared to accept promising students with less orthodox academic backgrounds and is ready to encourage any student wishing to undertake a program of study leading, in effect, to an interdisciplinary degree sponsored by the department.

Thus, all students are urged to search widely in both the *Bulletin of Duke University: Undergraduate Instruction* and the *Bulletin of Duke University: Graduate School* for information about the intellectual resources of the University. Special attention should be given to announcements of the Departments of Anatomy, Anthropology, Biochemistry, Botany, Chemistry, Geology, History, Mathematics, Microbiology and Immunology, Pharmacology, Philosophy, Physiology, Psychology, Sociology, and Zoology; announcements of the Schools of Engineering and Forestry and Environmental Studies should also be consulted.

Courses of Instruction

200. Advanced Neuroscience I
201L. Animal Behavior
203L. Marine Ecology
204L. Community Ecology
206S. Controversies in Biology
213L. Behavioral Ecology
216L. Limnology
222L. Entomology
226L. Ichthyology
234S. Problems in the Philosophy of Biology
237L. Systematic Biology
244. Principles of Immunology
245S. Radiation Biology
247S. Photobiology
249. Comparative Biomechanics
250L. Physiology of Marine Animals
259L. Laboratory in Biomechanics
269. Advanced Cell Biology

274L. Marine Invertebrate Zoology
278L. Invertebrate Developmental Biology
280. Principles of Genetics
281. DNA, Chromosomes, and Evolution
283. Extrachromosomal Inheritance
286. Evolutionary Mechanisms
287S. Macroevolution
288. Mathematical Population Genetics
293L. Population Biology
295S, 296S. Seminar
353, 354. Research
360, 361. Tutorials

Courses Currently Unscheduled

215L. Primary Productivity in the Seas
233. Principles of Insect Behavior
355, 356. Seminar

Related Programs

The University Program in Cell and Molecular Biology. See announcement in this bulletin.

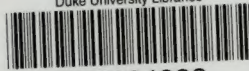
The University Program in Genetics. Genetics courses offered by the Department of Zoology are part of the University Program in Genetics; see announcement in this bulletin.

The University Program in Marine Sciences. Consult Marine Sciences in this bulletin for offerings at the Duke University Marine Laboratory.

Program in Tropical Biology. Fellowships are available for travel and subsistence in field-oriented programs in Latin America. Refer to Organization for Tropical Studies in this bulletin in the section on special programs.

Bulletin of Duke University
(USPS 073-680)
Durham, NC 27706
POSTMASTER send change of address
to:
Graduate School
118 Allen Building
Duke University
Durham, NC 27706

2nd Class
Postage
PAID
at Durham, NC



D02604998

**DUKE UNIVERSITY
LIBRARY**



DURHAM, NORTH CAROLINA

27706



D02604998



Duke University Libraries